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DEPARTMENT OF COMMERCE
BUREAU OF FOREIGN AND DOMESTIC COMMERCE
PHILIP B. KENNEDY, Director

SPECIAL AGENTS SERIES—No. 182

THE LUMBER MARKET IN ITALY AND RECONSTRUCTION REQUIREMENTS

By

NELSON COURTLANDT BROWN
Trade Commissioner

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LETTER OF SUBMITTAL.

DEPARTMENT OF COMMERCE,
BUREAU OF FOREIGN AND DOMESTIC COMMERCE,
Washington, June 27, 1919.

SIR: There is submitted herewith a report by Trade Commissioner Nelson Courtlandt Brown on the lumber market in Italy and the requirements of the next five or ten years for reconstruction purposes. The book is the result of Mr. Brown's extensive investigation in southern Europe on behalf of various lumber associations and the Department of Commerce. It contains much valuable material on the normal lumber trade, production, and use in Italy, the changes caused by the war, and the probable trend of Italy's import trade in lumber, with special reference to the opportunity for American woods.

Acknowledgement is made to the American Ambassador and American consular officers in Italy, as well as various officials of the Italian Government, for assistance rendered to Mr. Brown in the course of his investigation.

Respectfully,

B. S. CUTLER,
Director.

Hon. WILLIAM C. REDFIELD,
Secretary of Commerce.

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COMMERCIAL ATTACHÉ'S VIEWS ON ITALIAN LUMBER SITUATION.

The following statement on the lumber situation in Italy, by Commercial Attaché Alfred P. Dennis, at Rome, was received too late to be included as an appendix to Trade Commissioner Brown's report. Since Mr. Dennis has had 10 years' experience in the lumber business, however, it is considered important that his views should be placed before the American lumber manufacturers, especially as they represent a very recent survey of the field, being dated September 17, 1919. Mr. Dennis has had the opportunity to see the country meeting the difficult problems of the early post-war period and to observe the gradual modification of the war hostility to Austria. Mr. Brown, on the other hand, encountered that hostility at its height and for his estimate of Italy's requirements was forced to rely on the sanguine expectations of a country still keyed up to the war pitch and not foreseeing the inevitable reaction of the first months of peace.

Italy's post-bellum lumber imports, in my opinion, will amount to less than they did in the period immediately preceding the war. It would surprise me to find the Italians importing as much as 1,000,000,000 board feet of lumber per year.

From what I have been able to learn, the reconstruction in the devastated areas is now going on apace without much concern for foreign lumber. The houses actually destroyed in the invaded region were surprisingly few, as contrasted with the wholesale destruction wrought in similar areas of Belgium and France. These houses, almost without exception, were of stone or brick construction, and new structures are arising after the similitude of the old.

Before the war Italy furnished about 50 per cent of its lumber requirements. Personally I feel that this ratio can be maintained in spite of the heavy cuts in Italian forests due to the exigencies of war. Moreover, the native forest losses will be largely offset by vast forest areas in the Trentino, the upper Adige, and Venetia Giulia. The Italians have already established sawmills in Albania, where heavy stands of fine timber exist, and the Albanian ports of Durazzo and Avlona are distant only one night's sail from the Italian Adriatic ports of Bari and Brindisi.

The chief factor, however, in cutting down the Italian demand for American lumber is the cost of getting it to Italy at the present extraordinarily high tonnage rates. I have heard of no firm quotation of American lumber, even of the cheapest grade, for delivery in Italy, at less than $100 per 1,000 feet. The latest firm quotation of which this office has been advised for southern yellow pine was $125 per 1,000 feet, Palermo (Sicily) delivery. The Italians simply can not afford to buy lumber at such prices, particularly with their lira worth only 50 per cent of its normal value in terms of the American dollar.

Now that the war has been over for nearly a year, Italian sentiment does not justify the view that hostility to Austria will interfere with the purchase of Austrian lumber by Italians. The Italians will buy their lumber where they find it best and cheapest, not concerning themselves very much as to the source of the supply. National hostility to what was once Austria-Hungary is effectually dissipated by the breaking up of the Hapsburg dominion into its component parts, some of which were never antagonistic to Italy. Austria to-day owns only a small portion of the great forest areas of the former Hapsburg Empire, from which Italy derived the bulk of its lumber imports. Extensive forest tracts are to be found in Bohemia, Slavonia, Croatia, and Herzegovina.

Furthermore, the Italians are expecting to find a new field on which they can draw for their lumber needs in the Caucasus, or the "Republic of Georgia," rich in mineral and forest resources, where they hope to acquire the dominant economic influence. The country is remote from Italy, but after all only half the distance that separates Italy from the United States.

Since the armistice American commercial agents have had indifferent success in placing orders for American lumber in Italy. The Italians seem to be getting along somehow with their greatly reduced consumption of lumber, just as they are managing to exist somehow despite their greatly curtailed supplies of coal. Later, when Italy has succeeded in getting on her feet, there are certain grades of lumber that she must have from us, just as she must buy American cotton, whatever its cost may happen to be. Certain heavy timbers for construction purposes, say 12 by 12 inches in long lengths of Douglas fir or southern yellow pine, will be absolutely needed here for railway and other construction. In other words, heavy construction timbers Italy must have from the United States, as she can not obtain them elsewhere. During the present period of financial difficulty, however, I am inclined to think that Italy must rely chiefly on the cheaper grades of lumber derived from its own forests and through imports from Switzerland and what was once Austria-Hungary.

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THE LUMBER MARKET IN ITALY AND RECONSTRUCTION REQUIREMENTS.

INTRODUCTION.

The following conclusions have been reached with regard to the market for lumber that may be expected in Italy:

(1) The Italian market will require around 3,000,000,000 board feet annually after the war, and a very large share of this total amount must be imported. It is likely that this large demand will continue for two to five years. After reconstruction work has been finished and stocks have been replenished the demand for imported supplies will probably be about 2,000,000,000 board feet annually.

There are four factors that underlie and contribute to the foregoing estimates, as follows:

(*a*) The normal annual imported requirements before the war were about 1,000,000,000 board feet.

(*b*) Little lumber has been imported into Italy since the outbreak of the war and this deficiency must be made up.

(*c*) An extraordinary demand will arise for the reconstruction of the devastated areas.

(*d*) The native forests, which contributed in a large measure, probably about 1,000,000,000 board feet annually, before the war, have been greatly overcut during the war. They will therefore not continue to play an important part in supplying the nation's needs for lumber.

(2) Italy is a young and growing country with great possibilities for future development. Not only did all building operations and wood-using industries not associated with war work cease to operate during the war, but in addition to this great deficiency, large plans are under way that will mean increased consumption of lumber. Although old historically, Italy is still rich in natural resources, and plans are already being made for the intensive development of large industrial enterprises, increased transportation facilities, agriculture, etc., which will mean an enlarged and constantly growing demand for lumber. As a nation Italy is only about 50 years old, and the increase in the imports of lumber of over 100 per cent during the last 40 years, combined with the above factors, is an index of its future growth.

(3) Without a great deal of effort, certainly without organized initiative on the part of American lumber manufacturers, American lumber has successfully entered the Italian market and made a very favorable impression. Italy is looking to the United States as the natural source of an important part of its future lumber needs, and the amount that the United States will ship to Italy will depend upon the enterprise, initiative, and skill with which this market is developed.

(4) Formerly a good share of the lumber export trade to Italy from this country had been only through London sales for European lumber markets, such as Hamburg, Rotterdam, Paris, etc. Before the war there was a distinct tendency in the trade to break away

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from this old custom. After the war it is likely that not only will the business be done direct but shipments also will be made direct, for there is no good reason why this should not be done. Banking facilities have been provided by the opening of American branch banks in Italy and by the establishment of Italian branch banks in this country.

(5) Austria heretofore has supplied a large share of Italy's imported-lumber requirements. The serious rise in stumpage values in Austria-Hungary, the excessive rise in wages, the general disorganization of the lumber trade, and the sentiment engendered generally against Austrian products will militate against reentrance into and reexploitation of the Italian lumber market.

(6) Altogether representative lumber has not been sent from the United States to Italy. Italy has sometimes been regarded in this country as a market for only low-grade and cheap lumber and consequently has often been the dumping ground for inferior shipments. Italy wants both medium and high grade lumber for certain special purposes, as well as cheap lumber, and there are great possibilities for the exports to Italy of American lumber of all grades on a permanent basis.

(7) In view of the anticipated heavy demand for lumber in Italy after the war and the disorganization of the lumber-producing regions of Europe, it will not be necessary to make the adjustments to European standards of measure that might be called for if there were a small demand and highly competitive conditions. The metric system is the official standard of measure for commodities on the Italian market, but Italian lumber importers have been accepting American lumber cut in feet and inches for the last 40 years, and at least under the conditions of the next few years they will continue to accept it.

(8) The great demand will be for timbers and boards in the rough. A large share of Italy's requirements is of softwoods for general construction purposes. For the first few years following the war at least, the great demand will be for rough lumber for general reconstruction of devastated areas, for car construction, shipbuilding, flooring, furniture, and general building purposes; the great fruit and vegetable, wine, and canned-goods trade will also require large quantities of box-board material.

(9) There is no other country so well equipped to furnish the requirements of the Italian lumber trade with respect to kinds and varieties, dimensions, and even price as is this country. The Baltic has only two kinds of woods to offer: Baltic pine, or redwood, and Baltic spruce, or whitewood. Generally speaking, these are used for very similar purposes. Austria has only spruce to offer (the same as that exported from the Baltic), Slavonian white oak, a wood highly appreciated in Italy, and beech, which is very similar to American beech and is used only for railway ties, for box boards, and for a number of miscellaneous purposes.

(10) No other timber-producing section or nation has heavy construction lumber, such as Douglas fir and southern yellow pine, nor such a variety of hardwoods to offer as this country. Austria, the principal competing nation, has only spruce—which is adaptable for use only as a light construction lumber and which is similar to our eastern or Adirondack spruce—and two hardwoods, white oak and beech.

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(11) The use of lumber in Italy and European countries generally has been determined more by custom and long usage than by the suitability of the various kinds of lumber for particular purposes.

(12) There is a lack of uniformity and standardization in lumber grading, manufacture, measurement, and distribution in Italy. Lumber from the United States is the only kind for which standard grades have been adopted for each species. Even in Sweden, with its highly developed lumber export trade, each mill has a different system of grading.

(13) Most of the American lumber sent to Italy has been southern pine. A small percentage is composed of 8,000,000 to 9,000,000 board feet of red gum and a smaller percentage of white oak. A few other woods have been introduced to the market, but their imports are extremely limited. These are Douglas fir, yellow poplar, tupelo, white pine, white ash, cottonwood, hickory, and a few others. The importation of American lumber has made rapid advances in the last few decades. In certain periods Italy has received more yellow pine than any other country in Europe, except England.

(14) The domestic lumber production, which normally supplied nearly half of the Italian requirements, has been so seriously depleted by cutting for the war program that it will be an almost negligible factor for a long time after the war. It formerly consisted largely of white and red oaks, silver fir, and spruce, chestnut, poplar, and larch, with a miscellaneous variety of hardwoods of comparatively little importance. Italy is practically without coal and with the normal imports shut off and coal selling at $75 to $140 per ton, wood was resorted to almost entirely for fuel purposes, with the resultant exhaustion of an all-too-small timber supply.

(15) There is a definite and assured opportunity to increase the use of lumber in general, as well as American lumber in particular. The war has changed many methods founded on deep-seated custom. Intelligent, tactful, and well-directed advertising should result in an increased use of lumber, and the demand thus created can be satisfied by American woods.

(16) Lumber can not be sold in Italy as in the United States. The customs, manners, and habits of the people must be given greater consideration. Political and social aspects, which sometimes seem of little importance here, are often of great consequence and assistance abroad. There is a distinct tendency in Italy in the direction of collective buying, aside from the factor of governmental control, and a desire to deal with large responsible selling organizations in this country.

(17) As a result of the lack of imports of lumber during the war and the need of all available native timber resources for war purposes, prices have risen 200 to 500 per cent or more above the prewar level.

(18) The advantages of American lumber over Austrian, Russian, and Baltic lumber may be stated as follows: (*a*) There is a great variety of lumber for each particular purpose. (*b*) Large sizes are obtainable, especially in widths and lengths. No timbers above 6 by 6 inches are obtainable elsewhere, and widths over 9 inches can seldom be had. (*c*) Clear stock is available; this is not true of other countries. (*d*) Uniform grades are established for each species. (*e*) A large and continuous supply is available.

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(19) The lumber product from the United States may be improved to compete better with lumber from other countries in the following ways: (*a*) Better and more accurate manufacture; (*b*) branding, showing grade, mill, species, and degree of manufacture; (*c*) more careful seasoning; (*d*) responsibility for product and careful inspection before shipment; (*e*) simpler forms of grading.

GENERAL DESCRIPTION.

Italy is made up largely of a peninsula extending from southern Europe in a general northwest and southeast direction into the Mediterranean Sea, the greatest highway measured in amount of tonnage in the world's maritime commerce. The peninsula extends farther in an east and west direction than in a north and south direction, and this is an important factor in causing a large share of its commerce to be directed to and from its western shores.

Italy's position as a long, narrow peninsula, with its two important islands of Sardinia and Sicily and the thousands of miles of coast line, renders it essentially a nation of maritime interests, and from the earliest days of the Romans its commerce has been largely on the seas.

In area Italy occupies about 111,000 square miles, which is about equivalent to the combined areas of the States of New York, Pennsylvania, Massachusetts, Connecticut, and New Jersey. It is the most densely populated country of importance on the Continent.

POPULATION AND ITS DISTRIBUTION.

The population of Italy, according to the most recent available figures, was 36,546,000 in 1916. There has been a marked increase in population in the last few decades. For example, in 1886 the population was 29,300,000; in 1896, 31,401,000; and in 1906, 33,248,000.

Italy is one of the most thickly populated countries in Europe, having 330.3 inhabitants per square mile in 1916, as against 264.8 in 1886. The density of some of the European countries and the United States is shown as follows: France, 189.5 (1911); Germany, 310.4 (1910); England and Wales, 618 (1911); Spain, 105.2 (1916); Austria-Hungary, 196 (1910); Continental United States, 34.3 (1916); Italy, 330.3 (1916).

The rapid growth of population, together with the lack of attractive and remunerative employment in Italy, has stimulated emigration in the past decades. Italy has sent out more emigrants within the last decade than any other nation, the emigrants numbering 872,598 in 1913. Of this number, 407,475 came to the United States and the remainder went largely to South America. The large number of Italians coming to this country has formed a sentimental and commercial bond between the two nations. Travel between the two countries has increased considerably in the last decade and this has contributed materially to a better mutual understanding and especially to an appreciation of American goods and American ways of doing business in Italy.

The greatest overcrowding of population in Italy occurs in the southern sections and in Sicily. Industries have sprung up to attract men in various lines of employment, in the north of Italy, and consequently the largest number of Italians coming to the United States are Neapolitans and Sicilians.

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COURTESY OF AMERICAN COMMITTEE ON PUBLIC INFORMATION.

FIG. 2.—VILLA BERTI AT NERVESA AFTER THE AUSTRIAN EVACUATION. THIS IS TYPICAL OF THOUSANDS OF STRUCTURES THAT WILL REQUIRE COMPLETE REBUILDING.

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COURTESY OF ITALIAN GENERAL HEADQUARTERS.

FIG. 3.—SPRUCE FORESTS ON ASIAGO PLATEAU, NOT FAR FROM THE FRONT, FORTUNATELY SPARED FROM HEAVY SHELL FIRE, IN STRIKING CONTRAST TO THE USUAL FOREST DESTRUCTION. THE STUMPS INDICATE THE LARGE NUMBER OF TREES THAT HAVE BEEN CUT FROM THIS FOREST FOR BARRACK LUMBER AND FOR FUEL.

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The withdrawal for military service of practically every man from 18 to 47 years of age, inclusive, contributed in a material way to the abandonment of all construction work and wood-using industrial employment that did not contribute directly to the winning of the war. Men were withdrawn in some cases entirely from lumber yards, furniture factories, woodworking establishments, car construction, and other lines of employment, unless they were required in work directly connected with the war. The result of this situation has been an almost complete stoppage in many woodworking lines of employment, and consequently there will be a much greater need for imported lumber now that the war is over.

INFLUENCE OF CLIMATE ON THE USE OF LUMBER.

The climate of Italy unquestionably has an important influence on the use and need of lumber. Generally speaking, the summers are long, hot, and dry, especially in the south. In Sicily especially the summers are exceedingly hot, and every effort is made to keep the homes, offices, and other structures as cool as possible. Many of the homes and shops are kept dark during the day. This general situation explains the use of very thick stone, concrete, or brick walls, which keep the interiors cool in the summertime and warm in the winter. The flooring is frequently made of uncovered tile, or sometimes brick or marble, in order to keep the place as cool as possible. All windows have shutters, which are usually kept closed during the day and in addition inside solid blinds are usually used to keep out the intense light. Whereas one finds a great deal of wooden flooring used in northern Italy, in such cities as Milan, Turin, and Genoa, there is a distinct tendency to abandon the use of wooden flooring as one goes from north to south. The winters are so cold and damp, particularly in Lombardy, Piedmont, and Venetia, the three important Provinces of northern Italy, that it is particularly necessary to use wooden floors, the brick, stone, tile, etc., being so cold on the feet that they are used only in the cheapest and most humble dwellings.

Tile roofs are used almost entirely as a covering for all kinds of structures in Italy. This is partly due to custom and a fear of fire in connection with wooden shingles, but it is more particularly due to the idea of permanence and durability associated with all kinds of construction work throughout Europe and the protection that tile roofs afford from the heat.

In addition to these features the climate is generally so warm and salubrious during a good portion of the year that the people spend a large measure of their time out of doors.

GENERAL LIVING CONDITIONS.

The first impression a traveler from this country has in going about Italy and examining into living conditions is the extreme tendency to live in crowded quarters. People in Italy are willing to live in much more congested conditions, generally speaking, than in the most crowded of the larger cities of the United States. Large families will often live in two or three rooms and it is not at all uncommon to find a whole family occupying one room.

Even smaller cities and villages appear to be much congested. That is, where American villages are made up of separate homes with yards around them, an Italian village has its houses built close

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together without individual yards. The houses are generally built close up to the sidewalk, if there happens to be one, as is often not the case, and the separate isolated home is very much the exception. For example, in a rural village practically all the buildings will often consist of a solid block or two of squalid old stone, brick, or concrete two-story structures built closely together. In other words, one goes from the village into the country immediately instead of gradually, as is the usual case under American conditions. The exception to this general rule is found in the case of the country villas scattered here and there in the more attractive locations.

These congested housing conditions are due no doubt to the long-established custom of communities living in close connection for mutual protection against the bandits who infested the unprotected country roads. Wars were so frequent not only between countries but between individual communities that centuries ago there was a strong tendency to build all cities and villages on hilltops surrounded by broad and high walls. The natural location of railways is along valley routes, and consequently many of the towns and villages are now located at least a short distance from the railway line. Within recent years there has been considerable building activity immediately along railways, rivers, and other means of communication.

RECENT INDUSTRIAL DEVELOPMENT.

Properly to understand the political and commercial situation in Italy and some of the causes underlying the importation and use of lumber it is necessary to review briefly the history of Italy during the last few decades.

Italy has been a unified nation only since about 1870. Prior to that date Austria held dominion over a large portion of what is now Lombardy, Venetia, and some of the other northern Provinces, while the Papal States occupied a good share of central Italy, and the kingdom of Naples occupied southern Italy and Sicily. Up to that time successive wars and the change of domination of a good share of Italy from various powers, such as Spain, France, and Austria, had drained the country not only of many of its natural resources, but of its national spirit and unity. Under Garibaldi and other great national leaders Italy recovered rapidly after about 1870 and has taken its place among the leading nations of Europe.

Until the last decade or so Italy's development has been largely along agricultural lines, and it has exported vast quantities of products of the soil, such as wines, silk, and fruits, to neighboring countries. Its commercial and financial life has been dominated largely by German influence. Within the last decade or more important industrial developments have taken place, particularly in such large centers as Milan, Turin, and Genoa. The recent great war no doubt has been of great material benefit to Italy, not only in throwing off the Germanic influence and recovering territory, but in giving it a sense of its own power and unity and a confidence in its ability to take its place among the great industrial nations. Great industries developed to turn out munitions and other war products will be utilized no doubt to manufacture articles formerly imported. Turin is probably exceeded only by Detroit as an automobile center. Milan has some of

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the best car-construction and locomotive works in the world, and at Genoa and other cities great industrial plants have been constructed and organized, which forecast a great future for the country. For example, the great Ansaldo Works at Sampierdarena and other suburbs of Genoa has increased its number of employees from about 8,000 prior to the war to about 85,000 during the summer of 1918.

Italy's industrial developments constitute a large factor in determining an estimate of the future needs of the country for lumber. The consumption of lumber, it has been found, follows directly industrial developments, and it is expected that in the future the normal lumber requirements will be increased considerably, aside from the amounts required as a result of the unusual conditions brought about by the war itself.

FOREIGN TRADE.

The foreign trade of Italy has shown remarkable growth since Italy became a unified nation. Owing to the lack of many essential natural resources for industrial development, such as coal, iron, petroleum, and lumber, the country's development within recent years has been largely along agricultural lines. In return, therefore, for many manufactured products, cotton, etc., Italy has sent to other countries the products of its agricultural activities. The trade balance has been maintained largely by sending out large quantities of silks, wines, lemons, oranges, rice, hemp, and other agricultural products, which have been readily taken up by countries, such as Germany and Austria-Hungary, that devoted their attention more to industrial development.

Italian foreign trade grew from 1,650,000,000 lire in 1863 to 6,200,000,000 lire in 1913. The imports into Italy from the United States increased from an almost negligible quantity in 1887 to a value of over 500,000,000 lire in 1912.

Italy's foreign trade in lumber, discussed under other headings, has increased markedly during the last half century. Italy has practically no lumber or forest products to send to other nations, but it has been a considerable importer of forest products, especially lumber, timber, railroad ties, and staves. Owing to the cutting off of its native forests to meet the emergency for all kinds of forest products in the war zone and to maintain the army of 5,500,000 men, Italy will have to seek foreign sources more than ever for its lumber supply. This subject is discussed in greater detail later in the report.

A great expansion in foreign trade followed the war of 1870 and this continued until the breach of commercial relations with France over the annexation of Tunis in 1887. Italy did not fully recover from this disaster until 1897, when the "modus vivendi" was reestablished between France and Italy. In 1904 the commercial treaty between Italy and Germany led to a great increase in the imports of manufactured articles from Germany and the movement of Italy's excess agricultural products to the Teutonic empires.

The value of the exports from Italy to the United States in 1918 was 127,568,219 lire, according to Italian provisional statistics, whereas the value of imports into Italy from the United States was 6,226,743,393 lire in the same year. A large share of the imports consisted of munitions and other war requirements, and foodstuffs.

[Additional foreign-trade statistics will be found in the appendix.]

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ECONOMIC CONDITIONS AFFECTING THE USE OF LUMBER.

GENERAL USE OF LUMBER VERSUS SUBSTITUTES.

In striking contrast with conditions prevailing in the United States, one is immediately impressed with the relatively small amount of lumber used in external construction in Italy. This is not only true of Italy, but obtains for general construction work throughout western and southern Europe.

In the United States, outside of the business districts and the more densely populated and congested portions of the larger cities, one is accustomed to find at least a good share of the dwellings built of wood. This is obviously predicated by the fact that American forests have been so abundant and so readily accessible that wood is relatively low priced and is the most natural construction material, together with the fact that there has been a great variety of kind and size to suit every possible purpose.

In Europe the native forests were swept away centuries ago to a very large extent and the people have long been committed, largely through custom, to the use of such lumber substitutes as stone, concrete, brick, plaster, and tiling, all of which are generally cheap and readily available. The various points of contention as to whether wood or other materials should be used in different types of construction, which are a matter of important discussion and concern in this country to-day, have long ago been settled in Italy.

It has become a demonstrated fact, however, that lumber can not be dispensed with even in a country where the forest resources are scant and where there is every inclination to use substitute materials whenever practicable. Although comparatively few homes or other structures are constructed externally or finished in wood, large quantities of wood are required for floor beams, interior trim, doors, framing, partition, flooring, rafters, etc. The question of wooden versus steel car construction has been argued and settled with the apparent belief that the wooden car, for both freight and passenger purposes, is the acceptable type. In contrast to the recent change in the United States from the wooden to the steel car on the better trains and railroads, in Italy there is no sentiment advanced in favor of steel, and it is likely that a large share of both the passenger and freight cars will continue to be built largely of wood.

One is inclined to be discouraged at first about the outlook for lumber in Italy; but aside from the use of lumber and wood generally in dwellings and office buildings, large quantities of lumber and forest products are required for ship construction, furniture, boxes and crating, mill construction, wharf and dock construction, concrete work for temporary construction, car construction, general railway work, crossties, piling, telegraph and telephone poles, ship spars, and a great many other uses for which wood has definitely proved that it is better than any other material.

At Messina an opportunity was afforded to see a good share of the reconstructed city after the disastrous earthquake of 1908. In December, 1908, the entire city of Messina was destroyed and left a heap of ruins; 80,000 out of a population of 180,000 were lost and the city was practically wiped out of existence. Many other smaller towns and villages in the vicinity of Messina, particularly along the

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shores of Calabria, were destroyed. In discussing the work of reconstruction of this city with the president of the Chamber of Commerce of Messina, together with architects and engineers, it was found that the people were usually committed to the use of stone, brick, concrete, etc., for external constructional purposes, and that it would be impossible to expect the people to continue to live in the temporary wooden homes constructed to house them immediately after the earthquake. An entirely new city, with wide modern streets, has been laid out and the work of reconstruction is rapidly taking place. At present there are said to be about 150,000 residents and the city is again becoming prosperous and progressive. Under the new building regulations all structures are limited to two stories and to not over 34 feet in total height above the pavement. All walls or parts of buildings not actually leveled by the earthquake were ordered to be pulled down and all new walls are now 18 to 30 inches thick.

Over 30,000 wooden houses were constructed immediately following the earthquake, of which about 5,000, together with a modern wooden hotel, were built of American lumber by Americans. In the last analysis each individual owner of the home will be a determining factor in the kind of permanent construction that will be undertaken, aside from the general restrictions laid down by the authorities. In almost every case the owners have wanted to return to the same general type of building in which they had lived prior to the disaster. The present work of reconstruction has been seriously delayed by the scarcity and excessively high cost of both labor and materials. When conditions approach the normal after the war, there will be a great boom in the building of permanent structures of various kinds. Although the exteriors probably will not be made of lumber, large quantities of wood will be required for doors, window sashes, blinds, interior trim, roofing and flooring, floor beams, rafters, stepping, etc. In the hot climate of Sicily the people desire masonry houses, which can be kept closed and dark and as cool as possible in the long hot summers and which provide some measure of relief from the extreme heat.

The following are given by builders, architects, contractors, lumbermen, engineers, etc., as the reasons why lumber is not used to a greater extent for dwelling and general construction purposes throughout Italy:

(1) There is a predisposition, founded on centuries of custom, to favor the use of substitute materials. This factor is much more important in Europe than in the United States where, on account of the rapid development of the country and constant changes in ways of doing things, there is more willingness to adopt new features in habits and modes of living. In many parts of Europe the best reason that seems to be adduced in favor of a custom is that some particular thing has always been done in a certain way and consequently it will continue to be done in that way. In other words, deep-rooted customs and prejudices are much more difficult of change and readjustment in Italy than they would be in the United States.

(2) There is a strong inclination to build dwellings and other structures that will last not only for 40 or 50 years, as in this country, but for centuries. Many people are now living in homes that date back to the fifteenth or sixteenth century in Italy and some date back to still earlier times. It is customary both in the larger

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cities and in the smaller towns of the United States to see structures dismantled and built over after being used for 30 to 60 years or even less. Many municipal and office buildings, as well as homes, have been in constant use for centuries throughout Italy and there is seldom the temporary aspect to structures that characterizes many building operations in the United States.

(3) The climatic factors mentioned are very strong. The thick masonry walls keep the interiors cool in the hot dry summers and they also protect from the sharp winters, which are keenly felt even in the southern parts of Italy.

(4) Stone and associated materials, such as granite, marble, and brick; substitute material, such as cement; and materials for the manufacture of tiling, terra-cotta work, concrete, etc., are readily and abundantly available throughout Italy. Consequently they are comparatively cheap.

(5) There is considerable fear of fires, and one of the strongest arguments that the casual observer finds against the use of frame houses and shingle roofs is the danger of fire. There are no well-organized and efficient fire departments that would compare with those of the United States except in the largest cities, and even there few organizations are maintained, and they are seldom called upon to extinguish fires.

(6) There are many artisans and workers skilled in masonry, stone, concrete, and similar work. Labor of this kind has been comparatively cheap and at the same time of excellent character. Although of minor importance, this is a factor that must be reckoned with.

In spite of these general reasons for the lower per capita consumption of lumber in Italy, it is believed that the use of forest products generally could be increased by intelligent and well-directed advertising and exploitation, especially in cases where wood can be used as cheaply and to better advantage. The promotion of wood as a material of construction has never been attempted in Europe as it has been successfully done in this country, and it is believed that there are distinct possibilities in this field.

DEPENDENCE ON FOREIGN MANUFACTURED PRODUCTS.

In comparison with the United States, Italy has neither a great amount nor a great variety of natural resources. Its industrial development is seriously retarded by the almost absolute lack of coal and iron. There are limited lignite deposits, which have received considerable development during the course of the war on account of the high cost and urgent need of all kinds of fuel. The few iron mines have been worked, but they are wholly insufficient to meet in any adequate manner the requirements for these basic materials. England has furnished Italy with a large share of its coal and pig iron, while the amounts of both these commodities coming from the United States have increased in the last decade.

Other commodities of which there is a great lack in Italy but of which large quantities are used, are timber, lumber, and wood products, cotton, machinery, and petroleum. Forest products sufficient to meet only about half of the total annual requirements were produced within the confines of Italy under normal conditions such as obtained prior to the outbreak of the war. The lack of these basic

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COURTESY OF ITALIAN GENERAL HEADQUARTERS.

FIG. 4.—ALPINE BARRACKS FOR ITALIAN ARMY.

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FIG. 5.—LOGS READY FOR TRANSPORTATION BY OVERHEAD CABLEWAY FROM THE FORESTS OF MANDRIOLI TO THE RAILWAY. THIS SHOWS HOW ITALIAN FORESTS WERE CUT CLEAR OF ALL MATERIAL.

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commodities has meant that Italy must depend upon foreign countries for a large share of its requirements of these materials in the raw form, and, still more important, it is depending upon foreign sources for many manufactured articles based upon these very commodities.

DEVELOPMENT OF INDUSTRIAL AND COMMERCIAL CENTERS.

In spite of the lack of basic natural resources, upon which the industrial life and success of any country are largely contingent, Italy has developed great industrial centers in the northern part of the peninsula and commercial centers along the seacoast, which have brought great prosperity to the country. On account of its geographical position in the Mediterranean and the configuration of its coast line, Italy is largely dependent upon maritime commerce. There is much coastwise traffic from port to port to supplement the facilities offered by the country's somewhat limited railway development.

The great industrial and commercial centers of Italy are Milan, Turin, and Genoa. Genoa is the second most important port in the Mediterranean and is not only the most important port of Italy but the medium through which moves most of the commerce to and from northern Italy. Great industrial communities have been developed in its environs, and there are now many large plants devoted to shipbuilding, car construction, and the manufacture of locomotives, furniture, and many other products, as well as steel and rolling mills, etc. The Giorgio Ansaldo plant at Sampierdarena has been developed since the war into one of the most important industrial organizations in all Europe.

Milan, a city of 700,000 inhabitants, has become a great financial, industrial, and commercial center and is often spoken of as the New York of Italy. Its development within the last few decades has been remarkable. It is the center of the textile industry of Italy, large quantities of Italian silks being shipped from Lombardy. Milan is one of the greatest car-construction centers in all Europe. In addition to making cars for the requirements of the Italian State railways and street-car lines, companies located in Milan send railway coaches and locomotives to France, Roumania, Serbia, Bulgaria, and Austria. Milan is also a great center for the manufacture of airplanes, rubber, and steel products. One of the largest concerns, called the Società Anonima Italiana Ernesto Breda, of Milan, is one of the largest industrial organizations in Italy. It has a capital of $20,000,000 and employs over 20,000 men.

Turin is one of the largest centers in the world for the manufacture of motor cars. There are several large companies organized for the manufacture of motor trucks and pleasure automobiles, as well as gas engines. It is also a great center for the manufacture of airplanes, furniture, musical instruments, and steel products. The development of these industrial centers has been no less than remarkable during the period of the war. All their activities have been devoted to munitions or other specialized war business, such as the manufacture of airplanes, cannon, shells, and motor trucks. The activities of all these great plants are being revolutionized so that they can meet the demands of the country on a peace basis. Practically all the industrial and commercial activities have been restricted to the

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production and transportation of materials needed to win the war, but these factories will now be rearranged to manufacture products such as tools, machinery of all kinds, locomotives, railway rolling stock, agricultural machinery, furniture, pleasure automobiles, business motor trucks, etc., which are seriously needed throughout Italy.

The entrance of Italy upon a new phase of its industrial development and a greater expansion of its whole industrial and commercial organization portends a greatly increased need for lumber, timber, and forest products generally. The manufacture of rolling stock will require large quantities of hardwoods and construction timbers that no other country can supply so well as the United States. The increased manufacture of automobiles will call for heavy and strong timbers like southern yellow pine, Douglas fir, and hardwoods. The extension of railway lines and other transportation facilities will require large amounts of crossties, railway coaches, bridge timbers, and lumber of various kinds. All the many fields of industrial and commercial activity will require lumber and timber in one way or another. It is a well-known fact that in the utilization of the forest product of any given country the great industrial centers are the most important consumers. Even such industrial enterprises as steel and rolling mills, which would not be thought of as large consumers of lumber and timber, require large quantities for planking, flooring, bridging, foundation work, molds, boxing and crating, fencing, partition work, benches, and many miscellaneous purposes.

The increase in industrial activity in Italy during the war is perhaps best reflected in the increase in capital invested. The following figures show the net investments in industrial undertakings from 1915 to June, 1918: 1915—14,000,000 lire; 1916—55,000,000 lire; 1917—266,000,000 lire; and the first six months of 1918—229,000,000 lire.

INFLUENCE OF GERMANY ON FINANCIAL, INDUSTRIAL, AND COMMERCIAL LIFE.

The influence of Germany over Italy prior to 1914 was very great. The average foreigner visiting Italy was impressed by the extent to which Germany controlled not only the financial life of Italy but its industrial and commercial life as well. Many of the large shipping, banking, and manufacturing concerns were either operated directly by Germans or controlled by their interests. Most of the public utilities, including water-power, street-railway, lighting, and gas and electric companies, were controlled by Teutonic influences.

This condition had not existed more than 12 to 15 years but it was becoming much more widespread and pronounced in the few years preceding the outbreak of the great war. After Italy broke away from Austrian influence about the year 1870, commercial treaties were entered into whereby Germany agreed to take Italy's excess agricultural products, and in return Italy agreed to take Germany's manufactured products, chemicals, etc. Certain concessions were also granted to Germany. After this German influence spread rapidly throughout Italy. In 1913 it was estimated that there were 40,000 German inhabitants in Milan alone. The total population of this city was only about 600,000. Within the last

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decade or more German capital became closely identified with Austrian capital, so that it became difficult to distinguish between the influences of the two Teutonic empires. Through the financial and commercial hold over Italy the so-called Austrian Timber Trust, formed in 1911, was able to place lumber in Italy to much better advantage. Prices were raised 20 to 25 per cent within about five years. Through interlocking directorates and financial alliances it became comparatively easy for the Austrian Timber Trust to control to a large extent the importation and distribution of its product, as against the lumber from competing countries. This condition became possible in spite of the fact that Austria has been Italy's traditional enemy.

For some time after the war the antagonism that the war has created will prevent a return of the Teutonic influence in Italy, and the United States should take advantage of this fact to form strong connections whereby American lumber can be introduced and sold for purposes served formerly by the Austrian product. When the Italian users have been shown the advantages of American lumber and the American trade has a firm hold, it is going to be exceedingly difficult for Germany and Austria to reestablish themselves in Italy. Furthermore, lumber formerly sold in Italy by German agents for Austrian, Swedish, and Japanese lumber manufacturers will be sold by the local purchasers of Italian, British, or Swedish concerns, which will no doubt replace the German and Austrian agents.

LABOR CONDITIONS.

One of the most difficult internal problems that Italy must face with the dawn of peace, as is the case with most of the warring nations, is the question of labor. At the outbreak of war in 1914 Italian industries were completely disorganized because of the lack of imported raw materials and the shutting off of the markets for many manufactured articles as a result of the scarcity of tonnage. This situation became more complex and difficult by reason of the return of many Italian laborers from foreign lands. From the oversupply of labor during the fall of 1914 and the early months of 1915, there was a sharp change in the situation when Italy entered the war in May, 1915, and nearly every able-bodied man from 18 to 47 was called to the colors. The Italian Army represents 15 per cent of the population of the country. A serious shortage in labor for war industries resulted, and great numbers of women, who before had scarcely entered industries or occupations involving manual or physical labor, were called in to meet the deficiency.

Many woodworking industries were operating in Italy at a great disadvantage because of the insufficient labor supply during the war. Many box factories, airplane plants, and other concerns working on war orders had men assigned to them from the Army to make up the great deficiency.

Under normal conditions labor has generally been cheap in Italy. The surplus of available men caused comparatively low wages and a heavy emigration, chiefly to the United States and South America, of around 1,000,000 men annually. The surplus of labor and its relative cheapness have helped to make comparatively cheap the construction charges with stone, concrete, brick, and other building materials involving considerable employment of manual labor.

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This condition, therefore, has militated to some extent against the use of lumber and timbers as building materials, a large share of which had to be imported on account of the cutting off centuries ago of most of the available Italian forests.

After the war great numbers of men will doubtless be employed in construction work and in industries that have not been operating during the war. As in the United States, the amount of construction work, and consequently the use of lumber, timbers, etc., will depend, indirectly at least, upon the cost of labor.

If the price of labor remains high in Italy, it may have a distinct influence upon the practice of working up lumber and timber imported in the rough to suit the local and individual requirements. The low labor cost has been largely responsible for Italy's requirement of lumber imported in rough forms. This condition has developed a desire to continue to import it in that form and the customs duties that prevailed prior to the war were built up on this theory as well as to protect home industries. A great deal of manual labor has always been used in working up the rough lumber into the finished forms, such as floors, doors, interior finish, trimming, store and office fixtures, sash, etc., in sharp contrast to conditions in the United States, where much of the lumber product is finished by highly specialized machinery in a few standard or accepted sizes and designs. If the cost of labor remains comparatively high, it may result in the importation of lumber to Italy, at least in a much larger measure, in finished or partly converted forms.

The actual cost of common labor in Italy varied in different parts of the country. Labor, generally speaking, was usually more efficient and skilled in the north than in the south, and even common labor commanded a higher daily wage. In the northern Provinces of Piedmont, Lombardy, and Liguria, common labor was paid about 4 to 7 lire ($0.77 to $1.35) per day of 10 hours. In the south this cost was 10 to 20 per cent under those figures. In 1918, however, common labor in the north was paid as high as 15 to 30 lire per day. General dock and port labor in Genoa before the war was paid 6 to 8 lire per day, whereas in 1918, 32 to 40 lire was paid for the same work and it was generally agreed that the class and character of the labor were much inferior.

The cost of labor has risen in Italy with the cost of most of the necessary commodities, such as food, clothing, and construction material, and the rate at which this cost will decrease and the future purchasing power of the lire will have an important bearing on the use of lumber in reconstruction work and in general building operations where lumber would ordinarily be utilized. Whether or not a heavy emigration of men seeking employment abroad will take place depends upon governmental restrictions, the demand for labor in industry and construction work within the country, and the wages offered as compared with the wages in other countries.

RISE IN PRICE OF COMMODITIES IN ITALY.

The rise in price of all commodities, including building materials, has been very marked throughout Italy. As a result of this sudden and rapid rise, together with the withdrawal of labor for the great army of 5,500,000 men at the front and the need of lumber and other structural materials for purposes directly associated with the war, practically all building activities ceased in Italy in the spring of 1915.

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Cost of Construction Materials in Italy from July, 1914, to June, 1917.

Kinds of materials.	First period.	Second period.	Third period.	Fourth period.	Fifth period.	Sixth period.	Seventh period.	Eighth period.	Ninth period.	Tenth period.	Eleventh period. [a]
Iron:	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*
Homogeneous, per quintal	26.50	30.50	36.50	36.50	47.75	64.50	76.75	81.00	81.75	105.00	115.00
Common, do	26.00	30.00	36.00	36.00	47.25	64.00	76.25	80.50	81.25	104.50	114.50
Lime, common, Giardini or Bauso, per ton	18.00	20.00	24.00	26.00	28.00	30.00	32.00	35.00	48.00	52.00	60.00
Bricks:											
Solid, for railways, per 1,000	26.00	28.00	32.00	35.00	42.00	47.00	48.00	50.00	52.00	52.00	53.00
Solid, for cellars, do	22.00	26.00	28.00	30.00	32.00	34.00	36.00	38.00	38.00	40.00	41.00
Hollow, 6 by 12 by 24 centimeters, do	23.00	27.00	29.00	32.00	35.00	36.00	38.00	41.00	43.00	45.00	46.00
Portland cement, per quintal	4.70	4.80	4.90	5.00	5.20	6.50	8.00	9.00	9.10	10.50	14.00
Wood:											
Fir, sharp-edged, per cubic meter	70.00	74.00	85.00	125.00	140.00	180.00	180.00	200.00	220.00	250.00	270.00
Pitch pine, sharp-edged, do	95.00	100.00	115.00	140.00	200.00	240.00	250.00	300.00	340.00	400.00	450.00
Fir planks, Trieste, do	80.00	82.50	110.00	145.00	170.00	200.00	200.00	210.00	220.00	270.00	300.00
Roman cement, per ton	6.50	7.00	8.00	8.50	9.00	10.00	11.50	12.50	13.50	14.50	15.50
Marseille tiles, per 1,000	80.00	82.00	85.00	90.00	95.00	100.00	110.00	115.00	120.00	130.00	140.00
Roofing tiles, plain-colored, per square meter	1.50	1.60	1.70	2.00	2.05	2.20	2.30	2.30	2.40	2.50	2.70
Nails, per kilo	.70	.80	.90	1.00	1.20	1.70	2.00	2.20	2.30	3.00	3.15
Wire, iron, do	.55	.70	1.00	1.20	1.50	2.00	2.50	2.70	3.00	3.50	4.00
Nails, wire, do	.35	.50	.60	.80	1.00	1.20	1.50	2.00	2.50	3.00	3.50
Coal for forges, per ton	30.00	50.00	70.00	90.00	120.00	180.00	200.00	250.00	260.00	270.00	320.00
Lead, per kilo	.50	.70	1.00	1.10	1.20	1.50	2.00	2.50	3.00	3.50	4.00
Firewood, per quintal	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	8.00
Cast-iron pipes, per kilo	.20	.37	.40	.42	.45	.50	.60	.70	.85	1.00	1.20
Asphalt from 10 millimeters, per square meter	3.00	3.50	4.00	4.65	4.75	5.20	5.50	6.00	6.25	6.40	6.50
Eternit (asbestos cement), do	3.90	3.90	4.00	4.25	4.50	4.75	5.00	5.50	6.00	6.75	7.50
Zinc sheets, do	.90	1.50	1.15	1.25	1.50	1.75	2.00	2.25	2.40	2.50	2.70
Quarry stone, per cubic meter	5.50	6.00	6.25	7.00	7.50	8.00	8.50	9.00	9.25	9.50	9.50
Stone for masonry, do	3.00	3.25	3.50	4.00	4.50	5.00	5.50	6.00	6.25	6.50	6.50
Linseed oil, per kilo	.94	1.05	1.15	1.35	1.55	1.60	2.10	3.00	3.10	3.20	3.35
White lead, do	.73	.77	1.01	1.16	1.27	1.61	1.73	1.76	2.00	2.95	3.33
Glass:											
Single, per square meter	1.40	1.70	2.00	2.50	3.00	4.00	4.50	5.50	6.00	7.00	8.00
Double, do	2.80	3.40	4.00	5.00	6.00	8.00	12.00	14.00	16.00	18.00	19.00
Pipes, galvanized-iron, per kilo	.60	.65	.70	1.00	1.30	1.50	2.00	2.20	2.30	2.50	2.70
Sheets, galvanized-iron, do	.54	.80	1.00	1.20	1.50	2.00	2.50	3.00	3.50	4.00	4.25

[a] Only 11 periods were given in the original table from which this translation was made, though the total period indicated (from July, 1914, to June, 1917) represents three years, or 12 three-month periods.

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Whereas building activities have stopped for a period of about one year in the United States, they have not been undertaken in Italy for about four years. The lack of available tonnage in which to import lumber had an especially strong influence on the price of this commodity on the Italian markets, and values 300 to 1,000 per cent above the pre-war levels were not at all uncommon.

The cost of living has advanced 100 to 300 per cent above the levels prevailing before the war, depending upon the location in the Peninsula and the kind of commodity. The cost of living in Italy was, no doubt, about as low as in any country in Europe prior to the war, but on account of the unusual scarcity of food and building materials it was among the highest in Europe during 1918. The accompanying table illustrates the rise in the cost of materials for construction from 1914 to 1917. Beyond the summer of 1917 many of these materials were entirely absent from most of the yards and stores formerly carrying them. It was a common remark that there were no prices for some of these materials on account of their scarcity. It is likely that should this table be continued up to the fall of 1918 the rise would be at least 100 per cent above the figures shown in the last column. In many cases, therefore, this would mean that the cost of these commodities has risen 300 to 1,000 per cent since the war started.

The accompanying table shows the cost of construction materials in Italy by three-month periods from July, 1914, to June, 1917. The prices quoted are for materials consigned c. i. f., either on the car or at the quarry.

TRANSPORTATION FACILITIES.

Owing largely to the fact that Italy is a young nation politically, it has not had the opportunities afforded other nations to develop its transportation facilities and they are neither fully developed nor built so as to serve the country as a whole to the best advantage.

The length of Italian railways in 1911 was about 10,680 miles, whereas in 1916 they had been increased to 11,722 miles, of which 8,644 miles were owned by the State. Owing to the rough topography through the greater part of the peninsula, the railways are built chiefly along the coast. There is also one running north and south through the mountainous section from Rome to Milan. The nature of the country requires that most of the railways run in a general north and south direction. Freight rates are discussed under the caption "Ocean and Rail Freight Rates" later in this report.

After the war the Italian railway lines will be considerably developed and extended. Several important valleys rich in agricultural resources have not been reached as yet by any railway and certain forests are so remote in the country districts of Calabria and Tuscany that lumber could be imported and placed on the markets cheaper than it can be cut and produced locally. Developments are also being projected to reach new mining enterprises and cities and communities not now located on any railway system. These railway projects will require considerable quantities of crossties, poles, bridge timbers, and lumber. The railway systems of Italy have paid comparatively little attention to crosstie renewals, repairs to rolling stock, new equipment, and general maintenance. For both extensions and

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repairs and renewals, therefore, the Italian State railways will be one of the most important consumers of imported lumber when normal conditions are reestablished.

There are few canals in Italy. The exceptions are in the broad Po River Valley, where a canal connects the city of Milan with the Adriatic Sea. Coastwise traffic on the sea relieves the railways to a considerable extent and doubtless will continue to do so. Most of the foreign commerce by sea goes to and from the ports on the west coast, and excellent transportation facilities radiate from Genoa, which handles a good share of the maritime commerce.

Electric traction began in Italy in 1900 and from 1900 to 1915 the percentage of railways electrified was greater in Italy than in any other European country. Plans are now under way for the electrification of 1,250 miles of railway.

UNDEVELOPED RESOURCES.

Prior to 1870, owing to constant wars and internal disturbances, the natural resources of Italy, limited as they are, were not developed to capacity.

Although Italy is rich in agricultural possibilities, only a portion of them have been developed, in such fertile sections as the valley of the Po River, the Provinces of Piedmont and Lombardy, and the rich agricultural land of Venetia. Rather primitive forms of agriculture have been the rule in the greater part of the country. The war, with its critical food situation, has done much to develop Italy agriculturally, and within the next few years agriculture will receive considerable attention, together with improvements in methods, buildings, and machinery. This development will require more and more lumber and timber.

In mining, Italy is somewhat limited in its possibilities. It produces over three-fourths of the world's supply of sulphur and is important in the production of a few other minor minerals and metals. Its extensive lignite mines have been intensively developed during the war.

In the development of hydroelectric-power possibilities, however, lies probably the greatest single opportunity in Italy's future. There are already developed in northern and north-central Italy about 2,000,000 horsepower in several important water-power projects. There are now in course of construction 27 hydroelectric power plants and many more are under consideration. Most of these water-power projects are in the Alps bordering Switzerland and Austria, along the Savoy Alps of the French frontier, and in the northern Apennine Mountains. Already many of the steepest mountain railway grades and many of the long tunnels through the Alps are being operated by power developed in these large plants.

The lack of coal has thrown Italy almost entirely upon electricity developed by water power for its supply of the power necessary to operate its great industrial plants. The future of Milan, Turin, and Genoa lies very largely along the lines of utilization of all the available water power. To the casual observer this does not mean that large quantities of lumber will be required. But the work

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involved in the installation of these plants and the transmission of electric power requires large quantities of timbers, railway crossties, poles, and general building lumber. It is said that even with the important quantity of electric power already developed, the possibilities of the extension of hydroelectric power throughout Italy are very great and for the next decade or two there will be large and important developments along this line. Projects are being considered in Sicily and the extreme southern Province of Calabria. Estimates of available water power to be developed in Italy vary from 4,000,000 to 8,000,000 horsepower.

FOREIGN-LUMBER REQUIREMENTS.

The normal annual consumption of lumber and products usually associated with it, such as timbers, both sawn and hewn, railway crossties, and staves, is the equivalent of a little over 2,000,000,000 board feet, valued at about $60,000,000. Of this amount, about 50 per cent, or about 1,000,000,000 board feet, valued at $35,000,000, is imported in normal circumstances.

Statistics of production and consumption as applied to the lumber industry are not compiled on so systematic or detailed a basis as is the case in the United States. Published figures and estimates are often conflicting. An effort, however, has been made to reconcile various figures that seem to be at variance with one another.

More actual wood goods are consumed for fuel and for charcoal in Italy than for lumber, timber, poles, crossties, and associated products. Italy consumes about 9,500,000 cubic meters of wood for fuel and charcoal every year. This vast consumption of fuel wood is largely explained by the lack of good native coal fields.

Italy annually produces about 2,800,000 cubic meters of lumber, timbers, crossties, and other wood products. This estimate does not include firewood and some of the lesser products, of which there is also a large output. Converted at 424 board feet to the cubic meter, the total annual Italian lumber production is equivalent to 1,187,200,000 board feet.

The native Italian lumber production is made up of a large number of species but does not include nearly the great variety that is found in the lumber markets of the United States. However, Italy produces in commercial quantities a greater variety of lumber than any other European country. Whereas there are probably around 100 distinct varieties of lumber entered on the lumber markets of the United States, probably only about 25 are produced in Italy and most of this number are of very little consequence. Of the total annual production there are slightly more hardwoods cut and placed on the markets in Italy than softwoods, the total amount of the former being about 1,500,000 cubic meters, whereas there are only 1,300,000 cubic meters of softwoods. The hardwood production consists largely of three varieties of oak, two of which are white oak of excellent quality and the other a red oak of very inferior quality. Some beech (similar to the American beech), chestnut, poplar, and a variety of other hardwoods are also cut in the Italian forests. The softwoods consist largely of silver fir and spruce, of which about 700,000 cubic meters (300,000,000 board feet) are produced annually. There are five varieties of local pines, which total

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about 550,000 cubic meters. The only other softwood produced is larch, which is similar to the eastern larch or tamarack of the United States and of which about 50,000 cubic meters are produced annually.

The following table shows the approximate annual lumber cut in Italy by kinds of wood.:

Kinds of wood.	Production.	
	Cubic meters.	*Board feet.*
Softwoods:		
Silver fir and spruce	700,000	296,800,000
Various Italian pines	550,000	233,200,000
Larch	50,000	21,200,000
Total	1,300,000	551,200,000
Hardwoods:		
Oak	800,000	339,200,000
Beech	250,000	106,000,000
Chestnut	200,000	84,800,000
Poplar	120,000	50,880,000
Other (ash, alder, maple, elm, cypress, sycamore, locust, basswood, birch, eucalyptus, etc.)	130,000	55,120,000
Total	1,500,000	636,000,000
Grand total	2,800,000	1,187,200,000

Further information regarding local practices and methods pursued in the Italian lumber industry, with particular reference to lumber manufacture, grading rules, technical characteristics of the various woods, and their utilization will be discussed later in the report.

IMPORTED SUPPLIES AND SOURCES.

Of the total annual imports of lumber and forest products, amounting to about 1,000,000,000 board feet, valued at $35,000,000, a large share was furnished by Austria. This was a natural source of a large part of Italy's imported lumber requirements because of its proximity and the fact that it had an excess production to export. It is believed, however, that Austria will be unable to supply more than a small percentage of its former exports to Italy because of the great demands for its native production at home to reconstruct large areas devastated by the Russians, because of the normal home demand, which has not been met during the four-year period of the war, and because of the great demands in Germany, Poland, and the Balkans. Moreover, the difficulties in the way of Austria's reentrance into export trade will be intensified by unusually high wages, a disorganization of transportation facilities, an almost complete disorganization and lack of equipment in the lumber industry, and, with respect to Italy at least, a strong feeling against the importation and use of Austrian products.

Prior to the war Austria-Hungary supplied Italy with about 78 per cent of its total lumber and forest-product requirements, whereas the United States, the next country in order of importance, supplied only 12 per cent. The remaining 10 per cent was supplied by Roumania and Russia and a number of other countries of comparatively little importance, such as Germany, France, Switzerland, and Sweden.

Official Italian statistics show imports of forest products amounting to about 1,500,000 metric tons annually under normal conditions.

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The customs classification for lumber imports is entirely different from that of the United States. The principal classifications are for so-called squared lumber and that sawn by the length, round and rough-hewn logs, staves, thin boards for boxes and veneers, poles and pilings, furniture wood, wood used for matches, etc.

The following figures show the division of the total annual imports according to these classifications: Rough lumber, heavy dimension stock, and sawn timbers, 1,200,000 metric tons; round or hewn timbers, 200,000 metric tons; poles, small poles, and piling, 50,000 quintals; staves, 20,000 quintals; thin boards for boxes and veneers, 20,000 quintals; furniture wood, 50,000 quintals; wood for matches, 8,000 quintals.

The rough lumber, heavy dimension stock, and sawn timbers which make up the bulk of the imported lumber supply consist of the following: Seven hundred thousand metric tons of Austrian spruce and fir, 120,000 metric tons of American yellow pine, 66,000 metric tons of Austrian larch, 100,000 metric tons of Austrian beech, 125,000 metric tons of ordinary furniture wood (consisting largely of Slavonian oak from Austria, American white oak, American red gum, Austrian beech, American yellow pine, Baltic pine, etc.), and 15,000 metric tons of lumber for a wide variety of miscellaneous industries.

The round and rough-hewn logs are made up of the following imported species: Ninety thousand metric tons of Austrian spruce and fir; 25,000 metric tons of American yellow pine, oak, mahogany, red gum, yellow poplar, etc.; 20,000 metric tons of Austrian larch; 20,000 metric tons of Austrian beech.

Almost the entire imports of staves are of oak, three-fourths from the United States and one-fourth from Austria.

The 50,000 quintals classified as furniture wood consists of imported varieties of the finest furniture, cabinet, and carving woods, including mahogany, teak, rosewood, and a large number of high-grade cabinet woods from the Tropics, particularly from Central and South America and Africa.

INCREASE IN LUMBER IMPORTS BEFORE THE WAR.

Italy's lumber requirements have not been stabilized as have those of many European lumber-importing nations. The rapid development of the country within the last 50 years has been reflected in the increased demand for lumber imports. Inasmuch as the lumber production of Italy has been about the same for the last 25 years or more the increased demand has not been due to any falling off in native production.

In 1897 the imports of lumber and forest products to Italy amounted to 497,000 metric tons, whereas in 1911 they had increased to 1,506,000 tons. This has been a rise of over 200 per cent in 14 years—a remarkable increase for so short a period. There are no published official figures regarding the lumber production of Italy for the last 25 years or more, but officials of the Department of Forestry, which has collected estimates and figures from time to time, believe that the lumber production was about the same for 25 years prior to the outbreak of the war.

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The following figures show the imports into Italy of lumber and forest products for each year from 1888 to 1911. Not only are they the best evidence of the rapid increase in imports, but they may also be regarded as a sound basis for predictions of future increases.

	Metric tons.		Metric tons.
1888	455,348	1900	604,647
1889	471,857	1901	633,055
1890	491,915	1902	705,829
1891	432,835	1903	743,304
1892	417,627	1904	793,945
1893	423,750	1905	846,681
1894	401,316	1906	994,216
1895	454,585	1907	1,161,694
1896	448,064	1908	1,322,533
1897	497,303	1909	1,524,086
1898	485,948	1910	1,534,013
1899	566,351	1911	1,505,660

PER CAPITA CONSUMPTION OF ITALY AND OTHER COUNTRIES.

The per capita consumption of forest products in Italy is about the typical consumption of countries that have a comparatively small production of forest products and that are located in comparatively warm regions. Throughout southern and western Europe, where the production of lumber is limited, the per capita consumption is far below that of Russia, the United States, Canada, and other nations with large areas of forests. The low per capita consumption of Italy is also explained, to some extent at least, by the congested manner of living.

The only fair basis of comparison is the per capita consumption of all classes of forest products, and the statistics for all countries are usually made on that basis.

The following table shows the annual per capita consumption of lumber and wood products in Italy, as well as in a number of other countries:

	Cubic feet.		Cubic feet.
Italy	14.4	Germany	36.6
United Kingdom	14.0	Sweden	120.0
Belgium	17.7	Austria-Hungary	57.0
Netherlands	13.1	United States	260.0
France	24.6		

The method of arriving at this figure for Italy is as follows: The domestic production of lumber, timber, poles, crossties, etc. (that is, all classes of forest products except fuel wood), is equivalent to about 2,800,000 cubic meters. The normal imports of forest products are equivalent to 1,500,000 metric tons. In round figures the total domestic production and imports are equivalent to over 2,000,000,000 board feet, or 5,233,200 cubic meters, at 389 board feet to the cubic meter.[a] This is equivalent to about 184,730,600 cubic feet of wood, at 35.3 cubic feet per cubic meter.

The annual production of fuel wood is about 9,500,000 cubic meters, which at 35.3 cubic feet per cubic meter, is equivalent to 335,350,000 cubic feet.

a This is the mean between 353 board feet to the cubic meter for squared timber and 424 board feet to the cubic meter for boards.

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The following table is a summary of the total normal annual consumption of all classes of forest products in Italy:

	Board feet.	Cubic feet.
Production of lumber	1,000,000,000	184,730,600
Imports of lumber	1,000,000,000	
Production of fuel wood		335,350,000
Normal annual consumption		520,080,600

By dividing the total in cubic feet by 36,000,000, the number of inhabitants in Italy, the per capita consumption is found to be about 14.4 cubic feet. This is about the same as the per capita consumption in the United Kingdom and the Netherlands but is far below that of the United States, which is preeminently a wood-using nation.

ANNUAL CONSUMPTION AND SOURCES OF SUPPLY DURING THE WAR.

The war obviously had a great influence on both the amount and the kind of forest products required for the nation's needs. At the outbreak of the war there was a serious decrease in imports of lumber and timber, owing to the lack of available tonnage. Soon afterwards, most of the building operations and general construction work gradually stopped throughout the country. All industries became converted to a war basis, so that only commodities essential to the winning of the war were produced. Furniture factories were employed in the manufacture of airplane parts and the manufacture of furniture, desks, etc., practically stopped. Woodworking plants and box factories were rearranged to manufacture sections for military barracks and munitions, boxes, etc.

As tonnage grew scarce, only the most urgent necessities were shipped—airplane lumber, barrack lumber and timbers, and forest products for specialized purposes associated with the maintenance of an army of 5,500,000 men. Instead of the normal requirements, western spruce and Douglas fir were imported for wing beams and other parts of airplanes, and special stock was imported for motor vehicles, munitions, and boxes in which to ship food, shells, and other materials to the front. Considerable lumber came from Switzerland for barracks and trench timbers. The domestic lumber production was entirely designed to meet the emergencies of the war.

The total annual lumber consumption in Italy fell off rapidly after the outbreak of the war in August, 1914. However, Italy continued to receive considerable imports of lumber during the fall months of 1914 from both the United States and Austria. The imports of lumber fell off sharply, however, in the early months of 1915 until Italy entered the war on May 24, 1915.

The falling off in the annual consumption of lumber may be attributed directly to the following factors:

(1) Lack of ships in which to import lumber.

(2) The gradual elimination of industrial and structural activities not directly associated with the prosecution of the war. A shortage of lumber was a very important factor in this process.

(3) The failure of the domestic lumber production to compensate for the lack of imported supplies, even though it had been greatly increased. Furthermore, domestic production was almost entirely limited to the needs of the Army at the front.

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CURTAILMENT OF IMPORTED SUPPLIES.

Official statistics show that there was a rapid fall in the amount of lumber imported immediately following August 1, 1914, and during the year 1918 it is estimated that practically no lumber was imported to Italy except for war-emergency purposes, such as lumber used for airplanes, gunstocks, automobiles, artillery, Army wagons, and for barracks, trench timbers, and similar purposes. The official statistics of the Department of Commerce at Washington show that whereas about 90,000,000 board feet of lumber was sent to Italy from the United States in the fiscal year 1913, only about 17,000,000 board feet was sent in 1918. The official Italian statistics show that the quantity of round and hewn logs decreased from 189,497 metric tons in 1913 to 23,841 metric tons in 1916, while in 1917 only 18,712 metric tons and in 1918 only 8,815 metric tons were imported. There was a sharp decrease in the amount of sawed lumber and timbers, which constitute the bulk of the lumber imports. From a total of 1,158,328 metric tons of this material imported in 1913 the figures dropped to 283,858 metric tons in 1916, 213,542 metric tons in 1917, and 116,274 metric tons in 1918.

It is obvious that after the Italian declaration of war on Austria in May, 1915, no lumber of any kind came from Austria, which had been the source of a large portion of Italy's requirements.

A natural conclusion as a result of this serious curtailment is that a large share of the deficiency must be made up following the conclusion of peace. The following table shows the imports of lumber (including poles, veneers, staves, shooks, etc.) into Italy in 1913 and the deficiency in each subsequent year, taking 1913 as the normal from which the deficiency is calculated:

Years.	Imports.	Deficiency.		Years.	Imports.	Deficiency.	
	Metric tons.	*Metric tons.*	*Board feet.*		*Metric tons.*	*Metric tons.*	*Board feet.*
1913	1,380,915			1916	314,945	1,065,970	672,627,000
1914	1,134,382	246,533	155,562,000	1917	236,089	1,144,826	722,385,000
1915	233,122	1,147,793	724,257,000	1918	126,164	1,254,751	791,749,000

The conversion from metric tons to board feet is made on the following basis: The imports into Italy are partly squared timber and partly lumber, the figures for which are not given separately; about three-fourths of the imports are softwoods. Therefore the mean (673 board feet) between the conversion factors for 1 metric ton of squared softwood timber (612 board feet) and of softwood boards (735 board feet) has been used in converting three-fourths of the total quantity, and the mean (505 board feet) between 459 board feet for squared hardwood timber and 551 board feet for hardwood boards has been used for converting the other fourth of the total. The result is necessarily only a rough approximation.

A vain attempt was made to compensate Italy's deficiency in imported lumber supplies by cutting the native forests to a much greater extent than in normal times and by increasing imports from Switzerland, which before the war imported more lumber than it exported. It is interesting to note that the lumber imported by Italy from Switzerland increased from 16,933 metric tons in 1914 to 193,000 tons in 1917, and during 1918 about 100,000 metric tons was

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imported. Practically the entire local lumber cut, as well as the imports from Switzerland, was devoted to war purposes, however, rather than to the need of material for cars, ships, flooring, interior trim, furniture, box and crating, railway crossties, and similar articles, the manufacture of which was practically eliminated during the war period. This situation became greatly intensified as the war continued. Practically all retail lumber-yard stocks, as well as the wholesale stocks, were requisitioned by the Government to meet the war emergency, and practically none of the wood-using industries was producing the same articles as in pre-war times. For example, woodworking establishments and planing mills were devoting their entire time to turning out ready-made barrack parts, duck boards, trench timbers, vehicle stocks, etc., while furniture factories were turning out propellers, airplane parts, or boxes used for packing shells, shrapnel, and various forms of munitions, food supplies, etc.

The following table giving imports of the principal forms of lumber, etc., into Italy in 1914, by months, shows the effect of the outbreak of the war on the Italian lumber trade:

Months.	Round or hewn logs.	Square or sawn lumber.	Firewood.	Months.	Round or hewn logs.	Square or sawn lumber.	Firewood.
	Metric tons.	*Metric tons.*	*Metric tons.*		*Metric tons.*	*Metric tons.*	*Metric tons.*
January	10,561	70,929	9,465	July	18,519	87,805	8,867
February	11,588	93,192	8,895	August	8,316	50,697	5,731
March	15,878	86,494	7,811	September	1,524	22,765	5,809
April	19,004	105,947	9,209	October	4,631	59,269	7,952
May	19,947	109,619	9,136	November	9,814	81,835	6,800
June	24,810	115,891	7,129	December	11,066	76,260	5,317

The statistics of lumber imports show a rapid falling off after Italy's entrance into the war. Austria, the principal source of lumber supplies in normal times, was completely cut off. The United States was the second country of importance in furnishing Italy's imported requirements, and after Italy entered the war the United States, with Switzerland, became the principal source of lumber imports. Switzerland normally imports lumber from other countries itself, and although it has more or less extensive forests it does not produce sufficient lumber for its normal requirements; but the country has been called upon to supply large quantities of lumber for both France and Italy. During 1915 Switzerland sent to Italy 75,203 metric tons of lumber, valued at over 12,000,000 lire ($2,300,000). It was rumored that some of the lumber coming from Switzerland to Italy during the war originated in Austria, and this may possibly be true, though it could not be confirmed.

The following table gives the imports into Italy of forest products from Switzerland during the years 1913 to 1918. It shows a marked increase in the volume of these imports soon after the war broke out.

Years.	Rough-hewn timbers.	Squared or sawed lumber.	Box boards.	Years.	Rough-hewn timbers.	Squared or sawed lumber.	Box boards.
	Tons.	*Tons.*	*Quintals.*		*Tons.*	*Tons.*	*Quintals.*
1913	9,698	4,998	102	1916	20,680	160,006	18,495
1914	11,333	5,600	30	1917	14,269	178,672	7,843
1915	12,236	62,967	479	1918	4,712	94,567	4,442

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The following figures show the total lumber imports of Italy from 1913 to 1918: 1913—1,380,915 metric tons, valued at 137,194,773 lire; 1914—1,134,382 metric tons, valued at 121,933,045 lire; 1915—233,122 metric tons, valued at 38,930,046 lire; 1916—314,945 metric tons, valued at 71,995,401 lire; 1917—236,089 metric tons, valued at 80,109,491 lire; 1918—126,164 metric tons, valued at 41,579,996 lire (provisional figures).

Expressed in round numbers and in terms familiar to the American lumber industry, instead of normal imports of about 1,000,000,000 board feet of forest products, there was imported into Italy in 1916 only about 200,000,000 board feet, in 1917 about 150,000,000 board feet, and in 1918 about 80,000,000 board feet. Even taking as normal the year 1913, in which the lumber imports amounted to only 870,000,000 board feet, the total deficiency from 1914 to 1918 aggregated 3,066,580,000 board feet. This quantity should theoretically be imported after the war in addition to the normal import requirements of about 1,000,000,000 board feet. Added to this are the increased needs of imported lumber for reconstruction and as compensation for the expected deficiency in the domestic production.

The imports of American lumber are considered under the heading "Kinds of lumber imported."

INCREASE IN DOMESTIC PRODUCTION.

No accurate figures have been compiled regarding the increase in the Italian production of lumber and forest products to compensate for the lack of the normally imported supplies and to meet the extraordinary demands of the war program.

In many of the Italian forests that were not to be worked under any conditions whatsoever prior to the war, all the mature or semimature trees were cut. All accessible stands of timber were wiped out, and many formerly considered to be inaccessible on account of remoteness and lack of transportation facilities were cut to meet the urgent demand. In some cases heavy transportation charges, formerly considered prohibitive, were paid to meet the extreme demand for lumber and timbers for the Army. First the forests near the front were cut, then those in the mountains of Piedmont and Lombardy, then the forests of central Italy, particularly Tuscany, and finally those of the Abruzzi and the extreme south in Calabria and Sicily. When the war broke out, only the best forests were used, but as they were sacrificed for the Army, the second-rate stands were lumbered, and finally anything that would yield lumber or even wood was taken. Many private forests were requisitioned by the Government. In extreme cases olive trees and cork-oak forests were cut for fuel wood, and roadside poplars and other trees were cut for special purposes.

The normal production of about 1,000,000,000 board feet of all classes of forest products, except fuel wood, was extended until, in 1918, it is likely that 1,500,000,000 to 2,000,000,000 board feet was cut. Likewise the amount of fuel wood produced, which is normally about 9,500,000 cubic meters, was increased to 1,500,000,000 to 2,000,000,000 cubic meters or more during 1918. Italy's forestry officials have estimated that the Italian forests, which before the war supplied nearly half of the country's normal annual lumber and associated wood requirements, will be able to yield only one-fifth to one-

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quarter of their normal production and that most of the better classes of forests will not be able to yield any lumber for the next 15 to 30 years or more.

This serious decrease in native production, therefore, must be compensated for by greater imports in the future; that is, instead of Italy's furnishing about half of its annual consumption of lumber and associated forest products, it will be able to furnish only one-tenth to one-eighth. This, however, is only one of several reasons why the future imports of Italy will be far greater than those of pre-war days.

KINDS OF LUMBER IMPORTED.

AMERICAN LUMBER.

The earliest record of the entry of American lumber on the Italian markets was in 1867, when a cargo of southern yellow pine came to Italy. It is said that it found a ready market, and although at that time there was comparatively little demand for imported lumber, its reputation spread rapidly and widely. In later years a great demand has developed for imported lumber, especially American lumber, which since 1900 has come into general use for a great variety of purposes for which its characteristics adapt it.

A large percentage (probably 85 to 93 per cent) of the American lumber that finds its way to the Italian market is made up of southern yellow pine, and practically all this material is the long-leaf yellow pine. Importers are rather particular about the number of rings that the lumber or timber shows on the end of each piece, and material that goes into general construction work especially is required to be of the close-ring variety. The Italian statistics of imports into Italy vary somewhat from those given by the Bureau of Foreign and Domestic Commerce at Washington. The latter classifies the exports of lumber and forest products into a large variety of items.

According to the Bureau of Foreign and Domestic Commerce statistics, the principal item of forest products exported to Italy from the United States consists of sawed pitch-pine timbers. In this item alone the amount decreased rapidly between 1914 and 1918. The following table shows the quantity and value of the exports of sawed pitch-pine timbers and of red-gum lumber from the United States to Italy for the years ended June 30, 1914 to 1918:

Years ended June 30—	Sawed pitch-pine timbers.		Red-gum lumber.	
	Board feet.	Value.	Board feet.	Value.
1914	64,483,000	$1,180,981	8,990,000	$470,562
1915	25,456,000	387,047	2,809,000	76,821
1916	29,946,000	495,794	185,000	4,650
1917	17,684,000	366,677	11,000	450
1918	983,000	27,550	598,000	32,764

The quantity and value of pitch-pine timbers and of red-gum lumber exported to Italy in 1914 exceeded those sent to any other foreign country except England. The exports to Italy of pitch-pine lumber from the United States (including boards, planks, and deals, but excluding beams) fell from 43,812,000 board feet, valued at $899,828,

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FIG. 6.—GOOD STAND OF SILVER FIR IN TUSCAN STATE FORESTS.

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FIG. 7.—LARGEST SAWMILL IN ITALY, CONSTRUCTED AND OPERATED ALMOST ENTIRELY FOR CUTTING LUMBER FOR BARRACKS, TRENCH TIMBERS, CROSSTIES, ETC., AT BOSCOLUNGA, WHERE CUTTING WAS PROHIBITED BEFORE THE WAR.

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in 1914 to 9,030,000 board feet, valued at $180,442 in 1917. Exports of pitch-pine boards, planks, and scantling amounted to 1,293,000 board feet, valued at $59,015, in 1918.

In the three years from 1915 to 1917, 3,005,000 board feet of American red gum was exported to Italy, as against 8,999,000 board feet exported in the one year 1914. Thus there was the average annual shortage, even though the demand continued to be constant, of nearly 8,000,000 board feet. In the four years of war there was probably a total deficiency of over 30,000,000 board feet of red gum alone, and it is reasonable to suppose that it would have been far greater than this had the war not interrupted the importation of red gum, because this lumber was rapidly increasing in favor, and the foregoing figures are based on the assumption that the red-gum imports of 1914 would be continued without increase. A small part of the deficiency was supplied by the increased shipments in 1918.

Aside from the southern yellow pine and red gum, which make up the bulk of lumber shipped to Italy, the United States has exported smaller amounts of white oak, Douglas fir, and small parcel lots of a number of other miscellaneous species, such as yellow poplar, hickory, white ash, and white pine.

The exports to Italy of American oak fell off from 1,580,000 board feet in 1914 to 331,000 board feet in 1915 and to nothing at all in 1916 and 1917. In the fiscal year 1918 the exports amounted to 163,000 board feet, valued at $9,695. The market for both red gum and white oak from the United States should broaden materially after the war. Red gum is readily sold and highly appreciated throughout the Italian market, whereas in some cases recently representative American white oak has not been sent to Italy to compete with other white oak offered for the same purpose. Japanese and Slavonian oak were the principal competitors of American oak prior to the war. The Italian market for American white oak should be developed, especially as a large part of the white-oak supply of Italy has been exhausted by the heavy demands of the war program.

In the year 1914, 61,000 board feet of hickory in the log was sent to Italy. Europe has no hickory or other wood that serves its purpose as well as the American hickory, which is very highly regarded in Italy for its great strength and toughness. It is especially in demand for vehicles, tools, machinery, and automobile-spoke stock.

In 1913, 20,000 board feet of yellow poplar was sent to Italy from this country. Under the classification of "All other boards, planks, and deals," 210,000 board feet of lumber was sent to Italy from the United States in 1913, which was valued at $8,737, and 54,000 feet in 1914, valued at $1,940. A large number of species made up this miscellaneous total; the principal varieties were white ash, white pine, maple, tupelo gum, and black walnut.

In 1914, 539,000 board feet of hewn timbers, valued at $14,129, was indicated in American official statistics as having gone to Italy. This was made up very largely of long-leaf pine, used for spars, masts, and heavy long timbers used for shipping keels, other ship timbers, and for heavy construction work in factories about docks, for scaffolding, and hoisting booms. A small portion of this amount was made up of white-oak hewn timbers, which were used principally for ship keels and heavy construction work.

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The quantity and value of lumber and timber of all kinds exported from the United States to Italy for the fiscal years 1914 to 1918 were as follows: 1914—119,524,000 board feet, valued at $2,622,266; 1915—46,951,000 board feet, valued at $824,101; 1916—70,874,000 board feet, valued at $1,175,932; 1917—29,133,000 board feet, valued at $757,256; 1918—16,674,000 board feet, valued at $1,567,729.

All of the foregoing figures represent the direct shipments made from the United States to Italy. In addition to this, some American lumber has been transshipped from England, the Netherlands, and Belgium, and even from Hamburg to Italy, but in the American official statistics these amounts appear as having gone to other countries. The transshipment of lumber en route to its ultimate destination has been greatly diminishing from time to time. Twenty years ago this was a very common practice, but during the period immediately preceding the war there was comparatively little transshipment, and after the war practically all shipments will be made direct. Sometimes lower freight rates, especially for parcel lots, were responsible for this situation. In other cases, Hamburg, Rotterdam, London, Liverpool, and Antwerp timber merchants who maintained large distributing yards were able to meet the market requirements in Italy more quickly and, in some cases, more cheaply than those who made direct shipments from the United States.

The following table, taken from the publication called "Il Legno Greggio," shows the kinds of lumber imported by Italy in 1913:

Italian names.	Common names.	Sawn lumber and timber.	Timber, hewn.
		Quintals.	*Quintals.*
Abete	Spruce and fir	7,310,000	900,000
Pitch pine	Southern yellow pine	1,155,000	.....
Faggio	Beech	1,002,000	200,000
Larice	Larch	660,000	220,000
Noce satin	Red gum	504,000	8,000
Quercia commune	Common oak	354,000	.....
Noce	Walnut	315,000	72,000
Rovere	Oak (white)	105,000	75,000
Teca delle Indie	Teak	63,000	.....
Pino	Pine	28,000	25,000
Cedro	Cedar	20,000	16,000
Castagno	Chestnut	9,000	60,000
Legno bianco	Whitewood	6,000	2,000
Frassino	Ash	5,000	19,000
Pioppo	Poplar	5,000	60,000
Acero	Maple	4,000	.....
Ontano	Alder	3,000	18,000
Okume	Mahogany	2,500	14,000
Ciliegio	Cherry	2,000	1,000
Betule	Birch	500	.....
Traversine ferroviarie	Railway ties	30,000	.....
Olmo	Elm	.....	50,000
Imbuia		.....	25,000
Quercia farnia	White oak (fine)	.....	17,000
Bessin	Tropical woods	.....	13,000
Sapele		.....	13,000
Tams		.....	6,000
Gabon	Gaboon	.....	3,000
Pali telegrafici di pino	Pine telegraph poles	.....	78,000
Total		11,583,000	1,895,000

AUSTRIAN LUMBER.

Prior to the war approximately 78 per cent of all the lumber imported to Italy came from Austria. About equal amounts came by sea and by land. For example, of all the imports classified in the Italian statistics for 1913 as common sawn lumber 5,890,000 quintals

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came by land and 5,693,000 quintals came by sea. The portion coming by land was shipped by rail, largely from Austria, across the northeastern Provinces of Venetia, 5,600,000 quintals coming over frontier points along the Julian and Carnic Alps. Only 276,000 quintals was imported through the Lombardy frontier, while only 14,000 quintals came by the Piedmont frontier adjacent to France. Of the half of the total imports that came by sea, a large share, amounting to 2,602,000 quintals, came to ports along the west coast of Italy, principally to Genoa, Naples, and Leghorn. Ports along the Adriatic coast received 1,375,000 quintals, while 1,582,000 quintals came to Sicilian ports, principally Catania, Palermo, and Messina. Only 134,000 quintals arrived at the port of Sardinia, which supplies its needs largely from its own pine and oak forests.

A very large share of the total amount of lumber and timber imported from Austria to Italy is made up of spruce (*Picea excelsa*), the same kind of lumber as that exported in large quantities from Sweden, Finland, and Norway, which is called whitewood in the English markets. Commonly mixed with the Austrian spruce and always included with it in the official statistics is more or less silver fir (*Abies pectinata*). According to certain customs in Austria, varying amounts of silver fir are permitted to be used. These amounts vary from 5 to 20 per cent or even more. When mixed, it is all sold on the same basis and used for the same purposes in practically the same way as balsam fir is mixed and sold in shipments of red spruce from the Adirondacks. It is said that in the Italian market the silver fir is generally preferred to Austrian spruce, whereas in Austria and Hungary the reverse situation is true. There are some technical differences between the two woods, which are discussed in another part of the report. When sold separately, the spruce and fir bring approximately the same price. The Italian name "abete" generally covers both species, but when fine distinctions are made the spruce is called "abete rossa" and the fir "abete bianco."

A small quantity of Austrian larch (*Larix europea*) is imported from Austria and is used for heavy construction and general purposes for which southern yellow pine is suited. In fact, Italian engineers and architects regard the European larch as having the same qualities of strength, durability, etc., as the American long-leaf pine. The two woods are often used for the same purposes, such as car construction, flooring, furniture, school desks, and office furniture, and for shipbuilding and general construction.

Small quantities of Slavonian oak come annually to Italy from Austria. The scientific name is *Quercus pedunculata*, and it is regarded as the oak "par excellence," not only in the Italian market but through Europe. Owing to the relatively small available quantity in Slavonia and the limitations placed upon the production by the Government officials, it has commanded unusually high prices. This has permitted the entry of American white oak and even Japanese white oak prior to the war. After the war an attempt should be made to export American white oak to the markets of Italy, and if good lumber representative of the various grades is sent it is likely that both the Slavonian and the Japanese white oak could be driven largely out of the Italian market. This would assuredly be the case

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should the price of American white oak be a little lower than that of the other species.

The other wood sent from Austria to Italy is Austrian beech (*Fagus sylvatica*), which comes largely from the lower mountain regions of Austria and Slavonia and which shows the same color, weight, strength, seasoning properties, hardness, toughness, etc., as the beech from the United States. It is imported chiefly for railroad crossties, for box boards used in crates for the lemon and orange trade of Sicily, and for a large variety of miscellaneous purposes, such as flooring, cheap furniture, toys, kitchen utensils, and woodenware.

BALTIC LUMBER.

Comparatively small amounts of Baltic lumber reached the Italian market. The principal reason is that since Austrian spruce has served the Italian market to a large extent, Baltic spruce would not be able to compete, with the relatively heavy freight rates involved. The only other wood that the Baltic countries have to offer is the Baltic pine or redwood; this is somewhat similar to the spruce and serves the same general purposes. The pine produced in Italy serves the purposes for which the Baltic pine might otherwise have been imported to a large extent. Furthermore, the Swedes and Norwegians have made little attempt to merchandise in Italy the lumber products of the Baltic as they have in Spain, Portugal, England, France, and other countries. The only likely opportunity for them is to place the Baltic pine with the Italian importers and lumber dealers for general construction purposes midway in quality between the cheap Austrian spruce and the southern yellow pine, which is highly regarded for general purposes on account of its strength, durability, and hardness. Italian woodworkers who have had experience with Baltic pine regard it highly, as it works up readily. It is not likely, however, that the imports of Baltic lumber into Italy will increase very markedly.

ROUMANIAN LUMBER.

According to the official statistics, Roumania is the country third in importance in supplying the Italian market, being preceded only by the United States and Austria-Hungary. Although both Italian and Roumanian official statistics show a considerable quantity of lumber moving from Roumania into Italy, it is a well-known fact that a good portion of the lumber officially published as coming to Italy from Roumania has been originally sold in Austria, owing to the fact that the lumber sent down the Danube River from Transylvania and other Provinces of eastern Austria-Hungary is reloaded and transshipped from Roumanian ports on the Black Sea to Italy. The exact amount that had its origin in Austria-Hungary before the war has never been determined.

Practically all the so-called Roumanian lumber is made up, like the imports from Austria, of spruce, with a small quantity of silver fir. Generally speaking, the Roumanian product is not held in so high regard as lumber from certain eastern Provinces of Austria-Hungary, and it finds its best market in the ports of southern Italy and Sicily.

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Considerable quantities of lumber are sent from Constantza on the Black Sea, an all-year port from which shipments of lumber can be made at any time. Other ports, such as Braila and Galatz, are closed during the winter period on account of ice. Small quantities of white oak and of beech are sent from Roumania to Italy, according to the official statistics, but the total amount is very small. The white oak is not considered of so good a quality as Slavonian oak and the beech as well, unless specially selected, is not of so good a quality as beech from Slavonia and Croatia.

The lumber sent from Roumania comes from the same botanical varieties of trees as are found in Austria-Hungary.

RUSSIAN LUMBER.

In 1912, Russia sent 24,657 metric tons of lumber to Italy. This came from Finland, from Russian ports along the Baltic, and from the Russian ports on the Black Sea. Most of the lumber coming from Riga and other Russian ports on the Baltic was the so-called Baltic pine or redwood (*Pinus sylvestris*), and this amount was much larger than is shown in the statistics either in 1913 or the years prior to 1912. The comparatively large amount is probably explained by the fact that cheap lumber and freight rates were offered. A considerable portion of the Russian lumber product came from Odessa on the Black Sea, by way of the Dardanelles, and was made up of spruce. As in the case of the Roumanian product, it is a well-known fact in the trade that a good share of the lumber shipped into Italy from Odessa had been originally cut and sold in Austria-Hungary, the lumber having been shipped down the Danube and along the Black Sea coast to Odessa, where it was transshipped to Italy. Some white oak from the Black Sea regions of Russia has also been marketed in Italy, but it is not regarded very highly on account of the hard texture and brittle character of the wood, combined with its wide and unsatisfactory grain and large number of defects, such as rot and loose knots. Some Circassian walnut also has come to Italy from the Caucasus, but it can not compete successfully on a large scale with the native Italian walnut, which is highly regarded.

There is a general impression in the Italian lumber trade that Russia will not be an important factor in supplying requirements after the war. This opinion is based upon the following: First, the disturbed political situation, which, it is believed, will continue for some time, has affected the manufacture and production of lumber for foreign markets; second, the best forests are inaccessible and the transportation facilities are inadequate to bring the products to ports on the Black Sea, where they may be shipped to foreign markets. Lumbermen who have spent some time in the Black Sea region have expressed the opinion that it will be a long time before the forests will be marketed to any large extent, on account of the relative inaccessibility of the forests, the high cost involved in placing the products on the market, and the lack of uniformity both in manufacture and in grading. It is said that Russian lumber is regarded as inferior to the Austrian product and considerable dissatisfaction has been expressed by importers and wholesalers dealing in the Russian product.

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OTHER SOURCES OF SUPPLY.

Many other countries than those mentioned ship lumber in one form or another to Italy. As has been mentioned, transshipments of lumber have been made through other countries, such as Germany, England, and the Netherlands. For example, in 1913 over 20,000 tons of lumber and timber were shown as coming to Italy from Germany. Owing to the fact that Germany is much more important as an importer of lumber products than as an exporter, this amount probably consisted of Baltic and American lumber, which was transshipped from German ports.

Switzerland in 1913 sent over 14,000 tons of lumber and timber to Italy. This consisted largely of the same kind of spruce and silver fir as is exported from Austria. France sent some maritime pine to Italy for cheap lumber, boxing, and crating, but the amount was comparatively small. The amount in 1913 was 6,000 tons, valued at 666,000 lire. Until 1912 Japan sent no lumber to Italy, but in that year 4,800 tons is reported in the official statistics, whereas in 1913, 1,000 tons was imported from Japan. This consisted only of Japanese white oak, some of which was sold by Hamburg agents. A number of other countries sent lumber to Italy but it consisted largely of cabinet and other fine woods used for special purposes.

QUALITY, PRICES, DIMENSIONS, AND SPECIFICATIONS.

In the past Italy has not required the same high quality of lumber that the United States has shipped to the German or the Dutch market. The bulk of the lumber coming to Italy from all foreign sources is of medium quality. However, it is a mistake to think that Italy wants only cheap lumber. Prior to the war it was sometimes regarded more or less as a dumping ground for some of the poorer lumber from the United States and this practice has injured the reputation of the American product. In exceptional cases lower grades than those actually ordered were sent, for it was sometimes felt that the cheapest lumber could be sent to this market without much difficulty. However, Italy has required some of the best grades of lumber, not only from the United States but from Austria as well, for some of its most important fields of lumber utilization, such as car construction, shipbuilding, furniture manufacture, and vehicle stock. On the other hand, a limited quantity of some of the cheapest grades has been required. Most of the shipments of southern yellow pine from this country have been Genoa prime, which is the same as the standard grade according to the Gulf Coast classification rules of 1910. It is estimated that between 80 and 95 per cent of all the shipments to Italy have been of the Genoa-prime quality. Evidently, therefore, the bulk of shipments of yellow pine at least have been of medium quality. In regard to hardwoods, much has depended upon the freight rates. As is true with most European markets, a large share of the hardwoods go abroad in parcel lots, and it is felt that when freights are high, the importers and agents can not afford to purchase cheap lumber. In other words, when freight rates are low cheaper grades of lumber are moved to the foreign field, whereas when freight rates are high only the better grades are shipped. High freights mean high-grade lumber and low freights mean low-grade lumber.

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After the satisfaction of the immediate demands for lumber for reconstruction, which means in a large measure medium-quality or even cheap lumber, Italy will require much better classes of lumber stocks than was the case prior to the war. This is the consensus of opinion of most of the important lumber importers and dealers throughout the country.

American lumber is the only kind imported into Italy that is graded according to printed and generally accepted grading rules, which are the same for each given kind of lumber. Even the Baltic group of countries, including Sweden, Finland, and Russia (particularly Sweden, whose export lumber trade has been highly developed and specialized) sends its lumber product to Italy under many different grades for the same kind of wood. Each company has its own rules and these are quite different from those of other companies, even though they cut and ship the same kind of lumber. In no case are these rules printed and distributed, as is the case in this country. The larger exporters have developed a reputation for their own particular product, and sales are made on this basis. Generally, however, there are five grades for Swedish pine—first, second, third, fourth, and unsorted. In Austria also each company has its own grading rules, which are different from those of other mills. In 1911 a large lumber corporation, colloquially known as the Austrian Timber Trust, was formed to standardize prices, methods of cutting, grading, etc.; but it operated only in eastern Austria-Hungary, particularly in the Provinces of Transylvania, Galicia, and Bukowina. Details of the Austrian situation are covered later in the report.

The lack of uniformity in the grading of both the Austrian and the Baltic lumber product has naturally given rise to considerable confusion. This situation offers American lumber manufacturers an opportunity to develop a greater trade along the lines that have already been established; that is, on definite, fixed grading rules, which, although seldom understood by the ultimate consumers of lumber in Italy, should and will, no doubt, be appreciated in the lumber trade when the American product is properly advertised in the Italian market.

It is impossible to quote average prices either for the general lumber market in Italy or for the market in any given port or city for a definite year or period prior to the war. No averages of this kind have ever been compiled, and the figures given are only approximate. The most satisfactory method is to furnish examples of prices for a given time and place, under stated conditions that may vary from time to time and from place to place. These conditions, which determine the ultimate prices more than anything else, are grades, sizes, time of year, freight rates, etc. Freight rates particularly fluctuate greatly from season to season and from year to year. Even prices quoted f. o. b. or f. a. s. at the port of shipment in the country of origin may vary from time to time. Where lumber vessels or steamers are required to call at more than one port, the freight rates are likely to be higher. Deck loads are carried at two-thirds of the ordinary freight rate and parcel shipments and stowage receive special rates. Special freight rates are sometimes offered to make up the cargo of a vessel sailing from an American port. These variable factors naturally cause considerable fluctuation in the delivery prices.

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It may be said, however, that southern yellow pine has been delivered at Italian ports at a price only slightly more than that of Austrian spruce. This has been true of the west-coast ports, such as Genoa, Naples, Leghorn, Palermo, Messina, Cagliari, and Savona; but it would not hold true for the east-coast ports nor for cities in the northeastern Provinces of Venetia, where on account of the low rail and water rates, the lumber from Adriatic ports along the Dalmatian and Istrian coasts could be delivered much more cheaply than the lumber product from the United States. However, Genoa is the great lumber market of Italy and not only receives the larger share of foreign imports but is the greatest single distributing center in the country. Genoa, Turin, and Milan are the most important consuming centers. American yellow pine has been delivered to Italian ports at lower prices than the unsorted quality or mill-run grade of Baltic pine, or redwood, from Sweden. American white oak undersells Slavonian white oak sufficiently to enter into successful competition in the Italian market, and red gum, on account of its exceedingly attractive grain, fiber, and color, its workability and desirability as a cabinet and furniture wood, has successfully competed against Austrian beech and even the local Italian walnut for certain furniture and cabinet purposes. Except for general construction, Austrian spruce supplies a much lower-grade lumber market than southern pine. The latter is used wherever strength, hardness, durability, and a pleasing grain and color are the particular requirements, whereas Austrian spruce fills the market for the cheapest and most common forms of lumber and is used for temporary construction, concrete work, the cheapest forms of flooring, sash, framing, doors, and interior finish. The desire for southern pine is so pronounced that architects and builders are willing to pay a higher price for it in preference to the somewhat cheaper Austrian spruce, which is much weaker, softer, more brittle, and more perishable. The Austrian spruce also checks badly and is difficult to season.

AMERICAN LUMBER.

Italy has been one of the most important markets in Europe for southern pine, the amount coming to Italy in certain periods having exceeded the shipments to all other countries of the Continent. Before the war not only yellow pine but other kinds of American lumber were transshipped to Italian ports from other European ports, such as Hamburg, Rotterdam, Antwerp, Liverpool, and London. This practice was due to the fact that England for a long time had been a great lumber market and the financial center of Europe. The consensus of opinion throughout the Italian lumber market, however, seems to be that not only will shipments be made direct in the future but payments also will be made direct, owing to the presence of American banks in Italy and the establishment of branch Italian banks in the United States.

As was previously noted, 80 to 95 per cent of all the southern pine going to Italy from the United States is of Genoa prime, or standard, grade, the remainder being either merchantable or prime. The flooring, which constitutes but a small percentage of all the southern pine, is made up almost entirely of kiln-dried saps, except that it is generally specified that about 90 per cent of the best face be free of

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knots, whereas the grading rules specify only 80 per cent free of knots. In some contracts it is merely stated that the timber shall be "good, sound, freshly sawn timber."

The two principal hardwoods exported from the United States to Italy, red gum and white oak, are largely of firsts and seconds, with a certain amount of No. 1 common. Both plain and quarter sawed white oak has been imported, but a large proportion is of plain-sawed oak. Both the heart and sap gum are imported, the latter being stained to imitate mahogany. Other kinds of American lumber usually have special specifications covering the agreement. The National Hardwood Association's lumber rules have covered to a large extent the shipments of American hardwood lumber to Italy.

The following prices were quoted by an important agent: In the early part of 1914 southern yellow-pine timbers, 9 by 10 inches and up and 20 feet in length and up, Genoa-prime quality, brought 68 to 70 shillings per load, ($33.09 to $34.07 per 1,000 feet, at 500 feet to the load), c. i. f. Genoa. Genoa-prime boards, 1 by 9 inches and up and 12 feet in length and up, brought £13 per standard ($31.95 per 1,000 board feet), c. i. f. Genoa. A good portion of the southern pine imported by Italy consisted of timbers, and a large cubic-foot average is poplar.

In the spring of 1914 timbers of 27½ cubic-foot average, Genoa-prime quality, which ran from 11 inches up, brought 82 s. per load ($39.90 per 1,000 feet), c. i. f. Genoa. A shipment of 12 cubic-foot average, with timbers running from 6 by 6 inches up, brought 64 s. per load ($31.15 per 1,000 feet), c. i. f. Genoa. Three by nine deals brought £13 to £13 10 s. per standard ($31.95 to $33.18 per 1,000 board feet) on the same basis.

Another importer quoted the following prices for the general period of a year or more prior to the war: Small merchantable-quality timbers 6 by 6 inches and up, brought 52 s. per load ($25.31 per 1,000 board feet) c. i. f. Genoa. Timbers of 30 cubic-foot average brought 63 s. per load ($30.66 per 1,000 board feet) in merchantable quality, c. i. f. Genoa. Short-leaf pine timbers usually brought about 10 s. per load ($4.87 per 1,000 board feet) less than that commanded by long-leaf pine. The Italian market is careful to observe the density and number of rings to the inch on southern-pine timbers, and it discriminates against the wide-ring timbers, whether they are of long-leaf or short-leaf pine. Southern-pine boards, 1 by 8 inches and up and 12 feet in length and up, brought £11 per standard ($27.04 per 1,000 board feet), c. i. f. Genoa.

Before the war red gum firsts and seconds in 1-inch stock brought 80 francs per cubic meter ($36.42 per 1,000 board feet), c. i. f. Genoa, while the No. 1 common 1-inch red gum brought 65 francs per cubic meter ($29.59 per 1,000 feet). For every ¼-inch increase in thickness there was an increase of 5 francs per cubic meter ($2.28 per 1,000 feet). For example, 1-inch first-and-second red gum brought 80 francs; 1¼-inch stock, 85 francs; 1½-inch stock, 90 francs; 2-inch stock, 100 francs; 2½-inch stock, 110 francs, etc. In the case of the first-and-second quality red gum in 6-inch widths and up, extra payment is made only on the basis of thickness, whereas extra payment is made for thickness in the case of No. 1 common grade for the 4-inch width and up.

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White oak, firsts and seconds, plain-sawed, brought 150 francs per cubic meter ($68.28 per 1,000 board feet), c. i. f. Genoa, prior to the war, and No. 1 common brought 135 francs per cubic meter ($61.45 per 1,000 feet) c. i. f. Genoa. The relative amounts of No. 1 common and of firsts and seconds depend largely upon freight rates.

AUSTRIAN LUMBER.

A large share of the Austrian spruce was imported in a mill-run or mixed grade, known on the Italian and French markets as "tombante," which literally means, "as it falls from the saw." Many mills in Austria grade their products differently for the French, Italian, German, and English markets. Several Italian firms have large forest holdings and lumber-manufacturing operations in Austria, and they cut their product according to local Italian customs. Each company generally has its own grading rules.

The tombante-quality spruce from Austria usually brought 55 to 60 lire per cubic meter ($25.05 to $27.33 per 1,000 board feet), c. i. f. Genoa. The best, or first quality, brought 70 to 78 lire per cubic meter ($31.88 to $35.53 per 1,000 feet). The variation within each grade allows for size limitations; i. e., there is a definite increase in price for wider and longer stock, as the trees grow to a comparatively small size in Austria, and a decided premium is paid on widths over 9 inches and lengths over 13 to 14 feet.

There is a considerable variation in the prices of spruce from the different Provinces of Austria, because, as is true in the United States, given localities or regions have developed a reputation for their products, which command higher prices on the market. For example, the spruce from Carinthia, Styria, and Tyrol has developed the reputation of being much better than that from Carniola, Bosnia, Galicia, and other parts. Only tombante quality is imported from Bosnia and Galicia, whereas first, second, and third qualities are commonly imported from Carinthia, Styria, and Carniola.

The following table shows the pre-war prices, f. o. b. Trieste, for first, second, and third grade spruce from the Austrian Provinces of Carinthia, Styria, and Carniola:

Grades.	Carinthia.		Styria.		Carniola.	
	Crowns per cubic meter.	*Dollars per 1,000 feet.*	*Crowns per cubic meter.*	*Dollars per 1,000 feet.*	*Crowns per cubic meter.*	*Dollars per 1,000 feet.*
First	55	26.35	50	23.95	42	20.12
Second	45	21.56	40	19.16	35	16.77
Third	38	18.21	33	15.81	30	14.37

Tombante-quality spruce is seldom sent to Italy from the three Provinces named in the table. Galicia and Transylvania spruce sent out from the Danube and Black Sea ports of Galatz, Braila, and Constantza is almost entirely of tombante quality.

In Austrian spruce manufactured in the Provinces of Carinthia, Styria, and Carniola, there is a difference of 2 inches in the width from end to end in the standard length of 4 meters (1 meter = 3.28 feet), although the thickness of these boards remains the same. These three Provinces take advantage of the short distance and consequent low freight rates to consuming centers in Italy to raise the

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prices for their product. In the Provinces of Bosnia, Bukowina, and Galicia the stumpage is much cheaper because they are more remote from the ports of shipment and the consuming centers; and on account of their comparative inaccessibility they are forced to manufacture a better-grade product in order to compete successfully with manufacturers more favorably located with reference to rail and water shipping points and to the ultimate consuming centers. Consequently the methods of manufacture adopted in the more remote Provinces are much more modern, and the product is generally of better quality and more accurately manufactured. All boards are square-edge and they are never tapering in form, as is the case in the Provinces nearest to the Italian markets.

A large share of the Austrian lumber manufactured for the export trade is cut in 4-meter lengths. This length is considered standard throughout the Mediterranean group of countries and has been accepted for so long a period that many houses are constructed to provide for the use of this length for floor beams, rafters, and other purposes.

Most of the Austrian product is cut into boards of various dimensions. The trees grow so small that it is impossible to send out large timbers. In fact, timbers 6 by 6 inches and up in size are rather rare. The boards are usually cut in thicknesses of 15 millimeters (1 millimeter = 0.03937 inch) and in the following widths: 15, 20, 25, 30, 35, 40, 45, and 50 centimeters (1 centimeter = 0.3937 inch). The "morali," or planks, are usually cut in 4-meter lengths, but also in 5 and 6 meter lengths, and usually in the following sizes in cross section: 7 by 7, 8 by 8, 9 by 9, 10 by 10, 12 by 12, 10 by 16, 12 by 14, 14 by 14, 12 by 16, 14 by 16, and 16 by 16 centimeters. The "mezzi morali", or half planks, are cut in the following sizes: 3½ by 7, 4 by 8, 5 by 10, 6 by 12, 7 by 14, and 8 by 16 centimeters. The "travi," or beams, are sawed according to measure from 15 to 30 centimeters in width, and from 3 to 6 meters in length.

The following table shows the principal sizes and qualities of Austrian spruce coming from the Black Sea and Danube River ports to Italian ports:

Kinds of lumber.	Length.	Thickness.	Width.	Qualities.
	Meters.	*Millimeters.*	*Centimeters.*	
Boards	4	12, 14, 18, 24, 29, 34, 38, 48	18 and up[a]	Three.
	4	5, 6, 8, 9	do	One (mixed).
	4	12, 18, 24	8 to 18	Do.
Deals	3 to 10	75 and 95	11, 15, 18, 19½, 22½	Do.
Scantlings	3 to 10	75	75	Do.
	4 to 6	30 to 110	30 to 110	Do.
Battens	3 to 10	60	18	Do.

[a] Average 26 to 28 centimeters.

Within recent years Bosnia has been the most important source of supply of Austrian spruce sent to Italy. Carinthia has been next in order of importance, then Styria and Carniola, followed by Galicia and Bukowina. The first four Provinces ship to Italy largely by way of Trieste and also direct by railway. Galicia ships lumber by boats from the ports of Galatz and Braila, while Bukowina ships by way of the Black Sea port of Odessa. Bosnian lumber has recently

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been shipped largely from the Dalmatian ports of Sebenico, Spalato, Gravosa, and Meskovitch on the Adriatic Sea. The Provinces of Styria and Carinthia ship largely by railway direct to Italy.

The best Austrian oak comes from the Province of Slavonia in the south, although some is exported from Croatia and Transylvania as well. Both good and poor stock, however, is said to come from Transylvania. The Slavonian oak has a wide reputation throughout western and southern European countries and is especially appreciated for its uniform color and grain, its soft, even, workable texture, and its conservative figure when cut on quarter grain. Probably the best of the Slavonian oak goes to the German and French markets. Only limited quantities are imported into Italy, and they are used chiefly for wine staves, car construction, and high-grade furniture and cabinet purposes.

The oak from Slavonia and Croatia comes to Italy by way of Fiume, while that from Transylvania, the amount of which is almost negligible, comes via the port of Galatz. Very small quantities are also exported from Bukowina by way of Odessa and from Galicia by way of Galatz.

From 200 to 250 crowns per cubic meter ($115 to $144 per 1,000 feet, at 353 board feet to the cubic meter) was paid, f. o. b. Fiume, for the best quartered Slavonian white oak before the war. This comes largely in 27, 30, 32, 35, and up to 60 millimeters in thickness, from 17 to 32 centimeters in width, and from 2 to 5 meters in length. The average sizes would tend toward the lower dimensions. The usual price paid for Slavonian white oak, however, was 140 to 160 crowns per cubic meter ($80 to $92 per 1,000 feet), f. o. b. Fiume. This was for the plain-sawed, mill-run stock in comparatively small sizes. As high as 700 lire per cubic meter (about $380 per 1,000 feet) has been paid, f. o. b. Fiume, for the highest grade and largest size of Slavonian oak, some flitches being up to 4 to 6 feet in width, 2 to 6 inches in thickness, and about 20 to 33 feet in length. This was sold "en boule;" that is, the boards were kept together in log shape after being sawed.

An important part of the imports of Slavonian oak to Italy is in the form of rough-hewn logs from 3 to 7 and 8 meters in length. They vary from 25 by 25 to 40 by 50 centimeters in cross section. Most of this material goes to the car-construction factories of Italy. The following table shows the pre-war prices, f. o. b. Fiume, for different lengths of this material. Conversions have been made at the normal rate of $0.203 for the crown and at 353 board feet to the cubic meter.

Lengths.	Prices.		Lengths.	Prices.	
	Crowns per cubic meter.	*Dollars per 1,000 feet.*		*Crowns per cubic meter.*	*Dollars per 1,000 feet.*
3 to 3.90 meters	90	51.70	6 to 6.90 meters	140	80.43
4 to 4.90 meters	100	57.45	7 to 7.90 meters	160	91.92
5 to 5.90 meters	120	68.94			

These sizes are made up to suit the requirements at the car-construction and other factories.

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FIG. 8.—ONE OF THE LARGEST DISTRIBUTING YARDS IN ITALY. ALL THIS MATERIAL WAS UTILIZED FOR WAR PURPOSES, AFTER BEING BROUGHT BY CABLEWAY ABOUT 8 MILES FROM SAWMILL TO RAILROAD.

FIG. 9.—LARGE WOODWORKING PLANT AND PLANING MILL NEAR ROME THAT HAS BEEN DEVOTED TO THE PRODUCTION OF WAR MATERIALS. IN THE FOREGROUND ARE LARGE POPLAR LOGS AND IN THE BACKGROUND SILVER-FIR DIMENSION STOCK AND CRATING FOR TRANSPORTING MUNITIONS.

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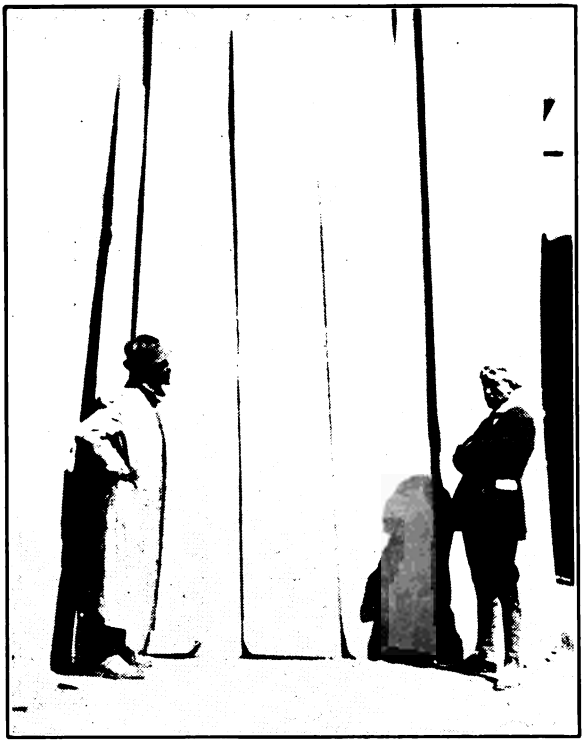

FIG. 10.—WIDE BOARDS OF SILVER FIR CUT IN AN ITALIAN NATIONAL PARK WHERE ALL CUTTING FOR COMMERCIAL PURPOSES HAD BEEN PROHIBITED BEFORE THE WAR.

FIG. 11.—OXEN HAULING LOGS TO THE SAWMILL—A FAMILIAR SIGHT IN ITALIAN LOGGING OPERATIONS. FOR ROUGH TOPOGRAPHY, HOWEVER, THE OVERHEAD CABLEWAY IS CUSTOMARY.

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The amount of Austrian beech coming to Italy from Austria has been gradually diminishing in recent years, owing to the competition from American red gum and to the use of southern yellow pine for furniture and other purposes for which beech had formerly been used. A large share has been imported in the form of evaporated beech for furniture. The evaporation is done in steam chambers for one to two days, during which the color of the wood is changed from a dull white or gray to a dark red, resembling somewhat the American red birch, or even mahogany. Only the sapwood is used for evaporation. The heartwood is usually defective and is often used for fuel or charcoal only. There is only one grade, and this is selected from the sapwood. Its sizes are chiefly 2 meters up to 4 or 5 meters in length, the majority being 3 and 4 meters. The widths are 20 to 32 centimeters, with an average of about 24 centimeters. In thickness there is a variation of 25 to 50 millimeters. There is generally a great assortment of all sizes in thickness and width, although the lengths do not vary much. There is generally one price for an assortment, and a reduction in price for lengths under 2 meters. The usual prices have been 80 and 90 crowns per cubic meter ($38 and $43 per 1,000 board feet at 424 board feet to the cubic meter), f. o. b. Fiume.

The best Austrian beech comes from the same Provinces from which the Austrian oak is exported, although Croatia in Hungary probably supplies the greater proportion of the beech exports. Bosnia has recently come into prominence as a source of supply for beech for export. Generally speaking, the beech grows in the higher elevations and the oak in the lowlands. The beech found growing with the oak is usually much inferior to that found on the higher elevations. Fiume is the most important shipping port of beech from Austria.

The larch sent from Austria to Italy comes largely from the high mountain elevations in Carinthia and the Tyrol. A little pine is sent from Carinthia, Bosnia, and the Tyrol, and a little from the Hungarian Provinces. Both the larch and the pine are shipped from Trieste and Fiume, as well as by rail.

BALTIC LUMBER.

The amount of lumber entering the Italian markets from the Baltic group of countries is comparatively small. It is estimated that the average annual imports are only 4,000,000 board feet, as compared with normal imports of 100,000,000 board feet from the United States. The principal source of this material is Sweden, and it consists almost entirely of Baltic pine, or redwood, as it is called on the English market. The only other species available for export from the Baltic countries is spruce; and inasmuch as it is the same kind of lumber as that exported from Austria, it can not be sent so long a distance and compete successfully with the spruce from Austria, which is about the same in general quality and can be obtained in much larger sizes. These larger sizes explain why Austrian spruce competes successfully with the Baltic spruce, even on the English market.

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There are generally four grades of Baltic pine—first, second, third, and fourth—and, in addition, a mill-run grade, which is generally known as unsorted or mixed quality, made up of all four of the regular grades, the percentage of each depending upon the local mill where it is manufactured.

Most of the imports from Sweden consist of deals of the third and fourth and unsorted grades. Probably 80 per cent of these deals are of the 3 by 9 inch size, the remainder consisting of 3 by 7 and 3 by 8 inch deals. Some boards, generally of the unsorted quality, come to Italy in 1 to 2 inch thicknesses, and are about evenly distributed in 1, 1½, 1¾, and 2 inch thicknesses, and 4, 5, 6, 7, 8, and 9 inch widths, with lengths 9 feet and up but seldom over 18 feet. There are a few battens of unsorted quality of 2½ by 7 inches and intermediate batten sizes. A few hewn timbers used for ship masts and spars and in house construction have arrived from time to time, particularly in the Sicilian market, at Palermo and Catania, 3 by 3, 3 by 4, 4 by 4, 5 by 5, and 5 by 6 inches in cross section and 12 to 25 feet long.

Practically all the Baltic pine comes to Italy cut according to English inches and feet. Occasionally lengths are cut according to meters or French feet, a French foot being one-third of a meter.

The prices of Baltic pine are somewhat higher than those for southern yellow pine from the United States, and considerably higher than Austrian spruce. The following figures, quoted by a prominent Italian importer, reflect the approximate average prices, c. i. f. Genoa, that obtained in the spring and summer of 1914: Small boards 1 to 2 inches thick and 3 to 5 inches wide, 9 to 12 feet in length, cost 265 to 280 lire per standard ($25.83 to $27.29 per 1,000 board feet) in unsorted quality. Third-quality deals, 3 by 9 inches in size and 12 to 18 feet in length, were about 375 lire per standard ($36.55 per 1,000 feet), and those of fourth quality of the same size, about 350 lire per standard ($34.12 per 1,000 feet).

The prices of Baltic pine vary considerably with the width and thickness. There are no timbers available even as large as 6 by 6 inches, and the 3 by 9 inch deals are about as large as are found in the Italian markets. The following list shows the pre-war c. i. f. prices at Genoa for boards of various widths in second-quality Baltic pine:

Widths.	Prices.		Widths.	Prices.	
	Lire per standard.	*Dollars per 1,000 feet.*		*Lire per standard.*	*Dollars per 1,000 feet.*
6 inches	335	32.65	8 inches	350	34.12
7 inches	345	33.63	9 inches	400	38.99

MISCELLANEOUS PRICES.

The following prices may be of interest as showing the retail cost of various kinds of lumber on the Naples market. They represent approximate average prices before the war: Austrian spruce in tombante quality or mixed grade, 60 to 65 lire per cubic meter ($27 to $30 per 1,000 board feet); southern yellow pine, in merchantable-quality timbers, in 25-cubic-foot average size, around 70 lire per cubic meter ($32 per 1,000 feet); Genoa-prime timbers of the same size, 75 to 85 lire per cubic meter ($34 to $39 per 1,000 feet); Baltic-pine deals,

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3 by 9 inches, in unsorted quality, 90 lire per cubic meter ($41 per 1,000 feet); Italian pine in mixed sizes and grades, 40 to 50 lire per cubic meter ($18 to $23 per 1,000 feet).

Among the hardwoods, the following prices were quoted under the same conditions in Naples: Austrian white oak in mixed sizes and quality, 200 to 300 lire per cubic meter ($91 to $136.50 per 1,000 feet); American white oak, plain-sawed, in firsts and seconds, 140 to 160 lire ($64 to $73 per 1,000 feet); white oak, quartered firsts and seconds, 200 to 250 lire per cubic meter ($91 to $114 per 1,000 feet); American red gum, firsts and seconds, 120 to 150 lire per cubic meter ($55 to $68 per 1,000 feet).

In contrast to some of the above prices, southern yellow pine during 1918 was bringing 800 to 1,000 lire per cubic meter ($255 to $318 per 1,000 feet, at the average exchange rate for 1918 of 13.5 cents to the lira), and practically none was available. Italian pine brought around 200 lire per cubic meter ($63.50 per 1,000 feet), and none of the American or Austrian hardwoods was obtainable at any price.

The following table shows the pre-war and 1918 prices of different species of lumber at Rome. Conversions have been made at the rate of 424 board feet to the cubic meter and at 19.3 cents to the lira for pre-war prices and 13.5 cents for 1918 prices.

Species.	Pre-war prices.		1918 prices.	
	Lire per cubic meter.	*Dollars per 1,000 feet.*	*Lire per cubic meter.*	*Dollars per 1,000 feet.*
Italian beech	40- 50	18.00- 23.00	200	63.50
Austrian beech, selected	80-100	36.50- 45.50	250	79.50
Austrian and Italian spruce	55- 70	25.00- 32.00	400- 450	127.50-143.50
American yellow pine	60- 80	27.50- 36.50	700- 900	223.00-286.50
Italian chestnut	80-100	36.50- 45.50	250- 300	79.50- 95.50
Italian walnut	120-150	54.50- 68.50	400- 600	127.50-191.00
American red gum	120-150	54.50- 68.50	700- 800	223.00-255.00
Siamese teak	250-300	114.00-136.50	(a)	.....
Washington spruce	100-150	45.50- 68.50	2,000-2,500	637.00-796.00
Swiss spruce	65- 75	29.50- 34.00	400- 450	127.50-143.50
Slavonian oak	150-180	68.50- 82.00	(a)	.....
American white oak	100-120	45.50- 54.50	(a)	.....

a None available.

The variations in these prices are explained by differences in sizes and quality. Very often in purchasing lumber at retail yards in Italy the buyer will look over the stock and select his own boards, the price depending upon how he selects his stock.

The following invoices are offered to show the range of prices of southern yellow pine and of Austrian spruce for various periods from 1910 to 1916:

Invoice of 665 pieces of pitch-pine sawn timber shipped from a port on the Gulf coast, April, 1910:

	£	s.	d.
665 pieces sawn timber, 11 by 11 inches and up; linear feet, 20 and up, 339$\frac{4}{10}$ loads, at 68s.	1,152	14	9
Less freight on 102$\frac{1331}{1440}$ standards, at 82s. 6d. (10 per cent at two-thirds rate)	409	13	6
	743	1	3
Less 2 per cent discount for cash	14	17	3
Draft at 3 days' sight	728	4	0

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	£	s.	d.
Invoice of pitch pine shipped from a Gulf port, November, 1912:			
549 pieces pitch-pine sawn timber, measuring 15,130 cubic feet (average, 27½ cubic feet), equal to 302.60 loads, at 102s. 6d.	1,550	16	6
Less freight on 91.69 standards, at 162s. 6d. (10 per cent at two-thirds rate)	720	2	11
	830	13	7
2 per cent discount for cash	16	12	3
	814	1	4
9,227 deals and boards,[a] Genoa prime, measuring 214,396 surface feet, equal to 108.28 standards, at £16	1,732	9	7
Less freight on 108.28 standards, at 162s. 6d. (10 per cent at two-thirds rate)	850	8	10
	882	0	9
2 per cent discount	17	12	9
Payment	864	8	0
Invoice of pitch pine shipped from a Gulf port to Genoa, February, 1914:			
Boards and planks from ¾ inch to 5 by 9 and up (Genoa prime and better), 372 $\frac{1224}{1980}$ standards, at £16	5,963	5	5
Stowage, $\frac{132}{1980}$ standard, at £10 13s. 4d		14	4
Floorings, 1 by 4 and 1 by 5 inches, 34$\frac{1452}{1980}$ standards, at £19	660	0	2
Kiln-dried saps, 79$\frac{459}{1980}$ standards, at £15 10s.	1,228	3	5
Dimensions, 6 by 8 and 8 by 8 inches, 148$\frac{414}{600}$ loads, at 75s.	557	14	4
Total	8,409	17	8
Freight, 506$\frac{1818}{1980}$ standards, at £6 10s.	3,294	5	10
25 standards, at £4 6s. 8d. (on deck, two-thirds freight)	108	6	8
Total freight	3,402	12	6
Grand total	5,007	5	2
2 per cent discount	100	2	11
Paid against documents	4,907	2	3
Invoice of pitch-pine cargo from a Gulf port, January, 1916:			
11,561 pieces of pitch-pine deals and boards, measuring 265,321 superficial feet, equal to 134 standards, at £21 15s.	2,914	10	0
14,416 pieces pitch-pine, kiln-dried saps, 1 by 4, measuring 73,930 superficial feet, equal to 37$\frac{470}{1980}$ standards, at £22 15s.	849	8	10
510 pieces pitch-pine sawn timber, measuring 11,222 cubic feet, equal to 224.44 loads, at 120s.	1,346	12	9
1,173 pieces pitch-pine sawn timber, measuring 13,193 cubic feet, equal to 263.86 loads, at 115s.	1,517	3	11
Total	6,627	15	6
Less freight	[b]4,788	6	
	1,839	8	10
Less 2 per cent discount	36	15	9
Payment by cash against documents	1,802	13	1

[a] From 1 inch to 4 by 9 and up.
[b] The freight on the four items of this invoice was £2,009 13s., £553, £1,015, and £1,210 13s., respectively.

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The following table shows the prices, c. i. f. Genoa, of Transylvania spruce boards, beams, and planks of various sizes and qualities, loaded at Braila in May, 1910, and in December, 1913:

Kinds of lumber.	Lire per cubic meter.	Dollars per 1,000 feet.
Loaded at Braila, May, 1910: [a]		
Boards, 4 meters long—		
24 millimeters thick, Monte quality	58.50	26.65
13 millimeters thick, III quality	55.50	25.30
24 millimeters thick, III quality	50.50	23.00
34 by 38 millimeters thick, III quality	50.50	23.00
24 millimeters thick, IV quality	40.00	18.20
29, 34, and 38 millimeters thick, IV quality	41.00	18.65
Beams, 4 meters long—		
34 by 68 millimeters	48.00	21.85
68 by 68 millimeters	48.00	21.85
December, 1913: [b]		
Boards—		
12 millimeters thick by 4 meters long, I quality	72.00	32.80
18 millimeters thick by 4 meters long, I quality	67.50	30.75
24 millimeters thick by 4 and 5 meters long, I quality	64.00	29.15
28, 33, 38, and 54 millimeters thick, I quality	66.00	30.05
12 millimeters thick by 4 meters long, II quality	66.00	30.05
18 millimeters thick by 4 meters long, II quality	61.50	28.00
24, 33, 28, 35, 54 millimeters thick, II quality	58.00	26.40
12 millimeters thick by 4 meters long, III quality	58.00	26.40
18 millimeters thick by 4 meters long, III quality	53.50	24.35
24, 33, 38, 54 millimeters thick, III quality	50.00	22.75
9 millimeters thick by 4 meters long, tombante quality	80.00	36.45
Boards 10 to 16 centimeters wide, "under measure," or scant tombante quality—		
12 millimeters by 1 and 3.50 meters	43.00	19.60
12 millimeters by 4 meters	50.00	22.75
18 millimeters by 4, 5, and 6 meters	49.00	22.30
24 millimeters by 4, 5, and 6 meters	48.00	21.85
Planks 75 by 225 millimeters by 4 to 8 meters	52.00	23.70
Beams—		
66 by 66 and 56 by 56 millimeters by 4 meters	55.00	25.05
75 by 24 millimeters by 3 and 4 meters	58.00	26.40

[a] 165 lire per wagon of 22 cubic meters paid for freight on account, 2 per cent discount for cash.
[b] Freight in gold, 215 francs for each wagon of 22 cubic meters.

The following were the prices of spruce boards 4 meters long, f. o.b. manufacturing point in the Tyrol and Carinthia, in 1913. Exchange was at the rate of 108.50 lire to 100 Austrian crowns; conversions have been made at the par rate for the crown of $0.203.

Thickness and quality.	Crowns per cubic meter.	Dollars per 1,000 feet.
10 millimeters:		
I quality	62	29.70
II quality	50	23.95
"Under measure"	35	16.75
14 millimeters:		
I quality	56	26.80
II quality	44	21.10
"Under measure"	31	14.85
20 to 50 millimeters:		
I quality	52	24.90
II quality	40	19.15
"Under measure"	29	13.90

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The following table shows the minimum and maximum prices for lumber at Catania, Sicily, for the years 1912 to 1917. With the exception of beams, which are sold by the cubic meter, they are based on the unit of 100 pieces of lumber, each 4 meters in length.

Kinds of lumber.	1912		1913		1914	
	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.
	Lire.	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*
Beams	a46	a48	a46	a46	a46	a46
Boards:						
1 by 10-14 inches, I quality, Carinthia	275	310	315	325	286	325
1 by 10-14 inches, II quality, Carinthia	225	280	270	280	236	276
1 by 10-14 inches, I quality, Styria	210	235	230	250	230	250
¾ by 10-14 inches, I quality, Carinthia	215	245	225	256	230	256
¾ by 10-14 inches, II quality, Carinthia	200	210	200	240	200	240
22-38 centimeters, I and II qualities, Bukowina	.....	.....	245	295	245	275
22-38 centimeters, III quality, Bukowina	.....	.....	215	225	215	225
¾ by 22-38 centimeters, I and II qualities, Bukowina	.....	.....	210	230	215	225
¾ by 22-38 centimeters, III quality, Bukowina	.....	.....	190	200	190	195
Half planks (mezzi morali), 3 by 1½ inches, Carinthia:						
I quality	105	105	105	115	110	120
II quality	90	95	95	100	100	100
Planks, 3 by 3 inches, Carinthia:						
I quality	185	195	199	210	195	210
II quality	155	175	155	195	180	195
Scaffolding, 1½ by 10-14 inches, I quality, Carinthia	410	475	450	475	450	475
Window shutters, 1 by 10-14 inches, I quality, Carinthia	135	180	165	180	165	165

Kinds of lumber.	1915		1916		1917	
	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.
	Lire.	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*
Beams	a60	a85	a110	a135	a200	a230
Boards:						
1 by 10-14 inches, I quality, Carinthia	340	570	120	210	275	350
1 by 10-14 inches, II quality, Carinthia	310	475	.....	.....	.....	.....
1 by 10-14 inches, I quality, Styria	275	275	.....	.....	.....	.....
¾ by 10-14 inches, I quality, Carinthia	290	294	200	.....	.....	.....
¾ by 10-14 inches, II quality, Carinthia	260	264	.....	.....	.....	.....
22-38 centimeters, I and II qualities, Bukowina	.....	.....	240	245	330	360
Half planks (mezzi morali), 3 by 1½ inches, Carinthia:						
I quality	120	150	.....	.....	.....	.....
II quality	150	.....	.....	.....	.....	.....
Planks, 3 by 3 inches, Carinthia:						
I quality	225	265	.....	.....	350	.....
II quality	210	210	.....	.....	.....	.....
Scaffolding, 1½ by 10-14 inches, I quality, Carinthia	476	.....	.....	.....	.....	.....
Window shutters, 1 by 10-14 inches, I quality, Carinthia	175	176	.....	.....	.....	.....

a Per cubic meter.

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The following table shows the prices of Austrian spruce lumber of first quality at Venice for certain dates before Italy entered the war:

Kinds of lumber.	Feb., 1912.	Jan. 1, 1913.	Jan. 1, 1915.	
			Lumber from Cadore.	Lumber from Carinthia.
	Lire per cubic meter.	*Lire per cubic meter.*	*Lire per cubic meter.*	*Lire per cubic meter.*
Beams, fine, 6 inches	40–41	40–43	40	38–43
	Lire per 100 pieces.	*Lire per 100 pieces.*		*Lire per 100 pieces.*
Boards, ¾:				
6 inches	72–73	80–81	51	78–80
7-10 inches	115–117	123–125	63	131–133
8-9 inches	116–118	124–126	63	133–135
8-12 inches	140–142	150–153	65	156–160
9-13 inches	160–163	171–173	67	176–180
10-14 inches	184–185	192–193	69	209–212
Boards, 8/4 (palancole):				
7-10 inches	402–404	410–412	77	422–425
8-12 inches	545–547	553–555	80	632–635
Half planks, Brenta, 35 by 70 millimeters	60–62	68–70	55	.....
Planks:				
Brenta, 70 by 70 millimeters (morali)	102–104	110–112	55	115–118
56 by 56 millimeters (morali bastardi)	70–72	78–80	55	.....
Scaffolding, 5/4:				
7-10 inches	203–205	212–214	69	247–280
8-12 inches	246–249	259–263	71	325–330
Strips, 4/4:				
7-10 inches	162–164	170–172	67.50	210–214
8-12 inches	195–197	203–205	69	280–284
Window shutters, 2/4, 7-12 inches	116–118	124–126	80	137–139

The second quality is valued at 10 per cent less than the first, the third quality at 17 per cent less than the first, and the "netto puglia," or fourth quality, at 25 per cent less than the first. The value of larch is 50 to 70 per cent more than that of spruce. The prices for 6-inch beams of fine larch is given as 44 to 45 lire per cubic meter in February, 1912; 40 to 46 lire per cubic meter on January 1, 1913; and 46 lire per cubic meter for lumber from Cadore and 44 to 45 lire per cubic meter for lumber from Carinthia on January 1, 1915. Owing to the fact that Italy did not enter the war until May, 1915, the prices for Austrian lumber in Venice, which is not far from the source of supply, have not risen very high.

STANDARDS OF MEASURE AND EQUIVALENTS.

By way of comparison with conditions obtaining in the lumber industry in the United States, where there are definite standards of measure familiar to all in the industry and grading rules that are printed and commonly understood throughout the trade, the lumber business in Italy seems to be conducted in this respect in a very haphazard and unsystematic manner. There are no printed specifications that are generally distributed and recognized for either imported lumber or the domestic grades.

There are practically no associations to further the interests of the business, either among the lumber manufacturers, as in the United States, or even among the retail lumbermen, the wholesale merchants, importers, agents, etc. The development of trade journals is certainly nowhere so complete and thorough anywhere in Europe as in

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this country. In Italy several commercial and trade journals cover the general field of commerce and business, but there are no periodicals devoted wholly to the lumber business, and so far as is known, there are none devoted to any particular industry, such as the steel and iron trade or the chemical trade.

This lack of generally accepted and printed specifications and grading rules, associations, and trade journals, naturally gives rise to misunderstandings and confusion within the lumber trade in Italy. With respect to the more important kinds of lumber imported, such as Austrian spruce, American yellow pine and Baltic pine, and American red gum, the various grading rules are generally understood only by the importers and agents. In the case of the American lumber there are, of course, definite printed rules but there were none printed and distributed for Baltic pine and Austrian spruce. In fact, for these species each sawmill in the producing section has its own grading rules and these differ from those of other mills, which are often located in the same locality. Importers and agents know by custom and experience the character of the grades of each mill and base their purchases on that general understanding. There is a distinct opportunity for American manufacturers to educate the lumber trade in Italy to an appreciation of the fact that American wood is graded along definite specified lines, and that although there is more or less variation within each grade, the specifications covering the various qualities of each lumber are in printed form and can be easily understood and applied by any one in the lumber business. It is true that Baltic lumber has generally given satisfaction because the individual mills have scrupulously held to their individual grades, whereas there have been many complaints with regard to American woods because some American exporters have taken advantage of foreign ignorance of the rules to send lumber unsatisfactory in quality. A campaign of education in Italy with regard to the American grades would show the Italians the advantages of being able to get a particular quality of wood, specified in the grading rules, from any American firm and would also expose to the Italian buyers any American firms that were not adhering to the grades. It might be added that to get the best results from this campaign of education, the American lumber interests should accompany it with such improvements in their manufacturing practice and their inspection system that American exports would have nothing to fear from the light of publicity.

The legal standard of measure in Italy is the metric system. In Venice and other portions of the Province of Venetia, comprising the extreme northeastern section of Italy, old standards are still used, such as the Venetian and Trieste inches and feet, which have been handed down from centuries of custom. The Venetian inch is equivalent to 29 millimeters (1.14 inches), while the Trieste inch is 26 millimeters (1.02 inches) in length. Establishments in the vicinity of Venice and Trieste and Udine still hold to these old measures, whereas the metric system is in common use in the rest of the country and is the standard on which the Austrian, Roumanian, and southern Russian lumber product is cut. There are, however, old local measures and standards in Naples, Rome, Milan, and elsewhere, which are exceedingly confusing.

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Generally speaking, for Italian commerce the metric system is not only the standard of measure but the basis of payment. The only exceptions to this rule are those noted and the case of Baltic and American lumber, which goes to Italy cut according to English feet and inches.

Although the Baltic and American lumber goes to Italy according to English standards, and lumber in the Province of Venetia is sometimes cut by the old Trieste and Venetian inches, practically all lumber of all kinds in Italy is purchased and paid for on the basis of the cubic meter, even if it is cut on other standards. The cubic meter is the basis of practically all measurements in the lumber business and in retail yards; even American lumber, cut in inches and feet, is converted into centimeters and millimeters for width and thickness, respectively, and into meters for length, and is sold by the cubic meter. There are some variations in the units in Hungary and in the Austrian Province of Styria.

The following are the bases of purchases of lumber from various countries:

American lumber, deals, and timbers, although manufactured in feet and inches, are usually purchased in Italy on the basis of the St. Petersburg standard, particularly in the case of lumber, which measures 1,980 board feet to the standard. Some purchases are also made on the basis of the 1,000-foot board measure. Timbers are usually purchased on the basis of the English load, which is the standard commonly used in England. A load of timber is equivalent to 50 cubic feet, or 500 board feet. Importers and purchasers of timbers, which make up a large share of the total purchases of American wood, usually state the given cubic-foot average; that is, they prefer to state the given average size, such as 25 to 30, etc. For example, the cubic-foot average of 30 means that the average-sized timber is 12 by 12 inches in cross section by 30 feet in length; or, in larger sizes, 16 by 16 inches in cross section by 17 feet in length, etc.

Baltic lumber is always purchased on the basis of the St. Petersburg standard. There is relatively little of it as compared with that from Austria and the United States, but the small quantity going to Italy is made up of lumber and deals, which are seldom over 9 inches in width. Practically no timber of any size goes to Italy from the Baltic. It is usually cut in English inches and feet for the Italian market. Occasionally Baltic lumber is cut in so-called French feet for length, but this is an exception. The French foot is equal to one-third of a meter, and consequently is slightly more than an English foot. Lumber cut in the Baltic group of countries (Sweden, Finland, Russia, and Norway) is largely cut for the export market in English feet and inches, so that it is not at all surprising that it should go to Italy in this form, as well as to Spain, England, and other countries.

Austrian lumber is always purchased on the basis of the cubic meter and is generally cut in meters for length, centimeters for width, and millimeters for thickness.

Local Italian lumber is usually cut according to the officially recognized metric standards, but there are in common use many local standards, the survival of measurements customary in the various regional kingdoms before Italy became a united nation.

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The statistics of imports of lumber and forest products into Italy are tabulated on the basis of the metric ton or the quintal, which is equal to one-tenth of a metric ton. Rough-sawn and hewn timbers and lumber are usually tabulated according to the metric ton, whereas other miscellaneous forest products, such as wood veneers, wood blocks for matches, box shooks, special furniture wood, poles, and other forms are tabulated on the basis of the quintal.

One of the greatest objections heretofore advanced by lumber manufacturers in the United States to engaging in the export lumber trade to certain parts of the foreign field has been the fact that importers in foreign countries are accustomed in some cases to have their lumber sawed according to the metric measure, and it was considered by American manufacturers inadvisable and even impossible to change their sawing methods to suit this particular requirement. A mill would be specially equipped either to saw only for the export field or only for domestic consumption; and since this separation appeared impracticable and since the mill could not saw both according to common American standards of measure and according to the metric system, the foreign market in some cases seemed unpromising.

With regard to the lumber market in Italy it will not be necessary at present to manufacture according to metric measurements, but the present grades can be revised and improved. American lumber manufacturers who are interested in cultivating the Italian lumber market will not need to specialize in manufacturing for the particular needs of this country. Neither will it be necessary to change the head blocks or gauges on American saw carriages to enter this field successfully and compete with other important lumber-producing districts, such as the Baltic, Roumania, and southern Russia.

The reasons for arriving at this conclusion may be summarized as follows:

(1) The Italian market has been receiving Baltic pine, called redwood, in the English market, cut in English inches and feet, for 60 years or more. The entrance of American lumber into Italy probably dates from 1867 and within the decade preceding the great war the amounts of lumber going to Italy from this country had increased rapidly. Consequently Italian lumber importers and users have been accepting American lumber, as well as Baltic lumber, cut in English inches and feet, even though the sizes are converted into the metric measure (that is, into centimeters and meters) and sold according to these standards in the wholesale and retail markets of Italy.

(2) The demand for American lumber will undoubtedly be large when anything like normal conditions are reestablished. This is an important consideration, because if the demand for American lumber were small and the competition very severe, it might be necessary to adopt a different policy in order to compete with other lumber-selling countries. However, while the extraordinary demands continue, importers and agents will be willing to accept American standards, even though in the past there may have been some question of their propriety.

(3) The lumber business in the Italian market, in the wholesale and retail trade as well as in the imports from foreign countries, does not follow any hard and fast lines from which it is difficult to deviate.

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The lumber is worked over and remanufactured much more than in the United States. There is a great deal of hand work in the various carpenter shops, planing mills, and woodworking establishments; large sizes are reduced to smaller dimensions to fit each particular need; doors, sash, and frames for windows, etc., are not turned out in great quantities along given or standard sizes and patterns. Consequently it is of much less importance that lumber be imported on only one standard of measure and cut to conform strictly to certain uniform sizes. There is much more flexibility and latitude than even in the United States.

The following list shows the lumber measures used in the Italian trade and their equivalents. The board-foot equivalents for the standard, the cubic meter, the metric ton, the load, and the cubic foot were worked out by the Forest Service:

	Equivalents.
St. Petersburg standard	165 cubic feet. 4.67 cubic meters.
Logs	1,320 board feet. 4.1 loads.
Squared timber	1,650 board feet. 3.3 loads.
Boards	1,980 board feet. 3.3 loads.
Cubic meter (stere)	35.3 cubic feet. 0.214 standard. 8 standard railway crossties. 0.2758 cord of 128 cubic feet. 0.47 to 0.37 cord of solid wood.
Logs	283 board feet. 0.882 load.
Squared timber	353 board feet. 0.706 load.
Boards	424 board feet. 0.706 load.
Softwoods	5.8 quintals.
Hardwoods	7.7 quintals.
Cubic meter "au réel"	0.20 to 0.30 cubic meter of sawn lumber.
Metric ton	1,000 kilos. 10 quintals. 2,204.6 pounds.
Logs:	
Softwoods	490 board feet.
Hardwoods	367 board feet.
Squared timber:	
Softwoods	612 board feet.
Hardwoods	459 board feet.
Boards:	
Softwoods	735 board feet.
Hardwoods	551 board feet.
Quintal	100 kilos. 220.46 pounds.
Logs:	
Softwoods	49 board feet.
Hardwoods	37 board feet.
Squared timber:	
Softwoods	61 board feet.
Hardwoods	46 board feet.
Boards:	
Softwoods	74 board feet.
Hardwoods	55 board feet.

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1,000 board feet	83.3 cubic feet.
Logs	3.53 cubic meters. 3.125 loads. 0.758 standard.
Squared timber	2.83 cubic meters. 2 loads. 0.606 standard.
Boards	2.36 cubic meters. 1.666 loads. 0.505 standard.
Load:	
Logs	40 cubic feet. 1.133 cubic meters. 320 board feet. 0.242 standard.
Squared timber	50 cubic feet. 1.416 cubic meters. 500 board feet. 0.303 standard.
Boards	50 cubic feet. 1.416 cubic meters. 600 board feet. 0.303 standard.
Cubic foot:	
Logs	8 board feet.[a]
Squared timber	10 board feet.
Boards	12 board feet.
Wagon	22 cubic meters.
Logs	6,226 board feet.
Squared timber	7,766 board feet.
Boards	9,328 board feet.
Cord:	
Space	128 cubic feet. 3.624 cubic meters, or steres.
Solid wood	75 to 95 cubic feet.
Shipping ton	40 cubic feet (round timber).
Hectare	2.47 acres.
Acre	0.4047 hectare.
Inch	25.4 millimeters.
Foot	304.8 millimeters. 30.48 centimeters.
French foot	13.12 inches (⅓ meter).

METHODS OF PURCHASE, SALE, DISTRIBUTION, ETC.

The business of importing and distributing lumber in Italy is somewhat complicated and does not follow any hard-and-fast lines. The present system has been developed to handle the business in a manner most satisfactory to those engaged in it. Many years ago England and the Netherlands handled the Italian lumber-importing business to some extent. During the last few decades, however, there has been a strong tendency to break away from this old custom, and immediately prior to the war practically all the timber business was handled by local timber agents and importers. Many of them were Italians, with a few Austrians, Germans, and Italian-Americans. The Swedes and Norwegians have not entered the Italian market as they have those of Spain, Egypt, and the northern African countries and other sections where they developed an excellent business. The explanation for this is probably found in the fact that Baltic pine and spruce are so similar to the Austrian spruce that the more distant woods find it difficult to compete on a large scale.

[a] For the logs from the Italian forests, which are small and involve much waste, 6 board feet to the cubic foot would probably be a closer equivalent.

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Several of the largest importers and distributers of lumber in Italy either have large forest holdings and lumber-manufacturing operations in Austria or are strongly connected with Austrian concerns. Several large Italian companies have been interested in competing for stumpage from Government-owned forest lands in Austria.

A large portion of the timber-import business is handled in Genoa, which is a distributing point for the great industrial and wood-using centers of Milan and Turin and other busy cities of northern Italy, as well as Genoa and its thriving manufacturing suburbs. Furthermore, this business not only is handled through Genoa, but since this city is the great port of entry for all commodities coming to Italy by sea from the west, a large share of the lumber is imported and distributed through this city. Naples, Leghorn, Palermo, Messina, Catania, and Cagliari in Sardinia, also occasionally import lumber directly from the United States and from Austria, but often the business has been handled through Genoa. Sometimes a sailing vessel or steamer will call at several ports and discharge portions of its cargo at each port. The freight charges, of course, are always higher in this case.

About half the imports of Austrian lumber by rail enter at various frontier points between the Province of Venetia and Austria. Trieste is an important timber-brokerage point for handling Austrian spruce, particularly that from Carinthia, Carniola, and Provinces along the Dalmatian coast. Fiume is the great port for handling the business in Slavonian oak and beech.

The timber-import business is largely in the hands of the so-called timber agents and importers. Other agencies engaged in the system of distribution of lumber are the wholesalers, retailers, and the ultimate consumer, or wood-using industries. In order that the functions and positions of these factors engaged in the importation and distribution of lumber may be properly differentiated, they may be briefly described as follows:

The timber agent is purely a commission man and acts as a broker. He buys for the account of the importer or other purchaser, usually at c. i. f. prices. His most important function probably lies in the bunching of orders from his clientele who individually could not afford or who do not care to handle a cargo load of 1,000,000 board feet or more.

The importer either buys direct or through the timber agent. He generally has a distributing yard at one of the large ports of entry and the larger and more important ones purchase and import their lumber direct, either for themselves or for the large consumers of lumber, such as the railways, car-construction factories, shipyards, etc. The importer usually carries the unloading charges at the port, the import duty, if any, and transportation to storage or onto cars at Genoa or other port. He usually buys on the c. i. f. basis and makes his sales on the basis of f. o. b. cars at the port of entry, the wholesaler and retailer or consumer paying the freight charges to the destination. The small importers are often forced to purchase through the timber agents.

The wholesaler buys through agents or importers, generally the former, as the business of the importer and the wholesaler is in a large sense competitive. The wholesalers generally have their own yards and sell to retail yards and to the large wood-using industries.

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The retailers are those with small yards, which serve the public and the small wood-using factories and industries. In the large centers of population the function of the retailer is generally supplied by the wholesaler or retailer who goes after the large orders. In many cases the retailers sell their lumber by the piece. In Italy the retailer does not do the proportionately large business nor occupy a position that is comparable with the retailer of lumber in this country.

By the consumer in the above category is meant the woodworking plant, carpenter shops, furniture factories, car factories, repair shops, shipyards, etc.

Sometimes the agents and importers specialize in only one kind or group of similar kinds of lumber. For example, some deal only in southern yellow pine from the United States, while others handle only Austrian spruce, and still others deal in hardwoods, or in tropical cabinet woods.

The car factories, shipyards, railways, furniture factories, vehicle plants, and other large purchasers sometimes buy in cargo or parcel lots through an agent or importer. The timber agent, if his clientele is largely composed of importers, is exceedingly careful not to compete with his own customers, or he will naturally lose their business.

The Austrian lumber manufacturers are well organized and within recent years have organized a combination to regulate prices. They had various timber agents scattered over Italy, and there was presumably competition between them, but all had an understanding as to the price level to be maintained. The same prices generally held for lumber from a given Province in Austria throughout the same season but were gradually rising from year to year, and they probably rose 20 to 25 per cent during the five years preceding the outbreak of the war in August, 1914. The Austrian prices, therefore, were generally well stabilized for each year, whereas those from the United States were not at all dependable, the prices varying naturally with the f. o. b. prices at the port of shipment; moreover, the freight rates fluctuated considerably. The Austrian lumber manufacturers sold through their own agents, distributed over Italy (in many cases, Italians), who in turn sold to wholesale merchants, who in turn sold to their own or other retail yards or to the large wood-using industries. On the larger orders, the agent would sell directly to the large factories, as previously noted. Generally the wholesalers had large yards at the ports or large distributing centers, and they distributed their lumber to the smaller country towns and cities inland and throughout the peninsula. These timber agents bought for the wholesalers' account. Usually contracts were signed in the fall for spring delivery, as is the case with lumber shipped from the Baltic ports. This was especially true in the case of shipments to be delivered in the first open water in the Danube River and Black Sea, only one of which, Constantza, is ice-free the year round. The southern Italian ports, and to some extent Naples and the Genoa purchasers, bought largely from the Danube and Black Sea sections. This lumber came largely from the Provinces of Galicia, Transylvania, and Bukowina, in eastern Austria and Hungary, whereas northern Italy purchased largely from the Provinces in western Austria and along the Adriatic coast and the Italian frontier.

The well-known Austrian timber trust, or syndicate, operated generally in the Provinces of eastern Hungary, including Transyl-

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vania, in Galicia, and to some extent in Roumania. This trust was organized in 1911 and 1912 by a number of prominent lumber manufacturers in Austria, Hungary, and Roumania, but the capital was largely German. The trust had not entered the Italian market to the same relative extent that it had entered Greece, Turkey, Egypt, Bulgaria, and the Black Sea region of southern Russia. The principal features of this so-called Austrian timber trust were as follows:

(1) All manufacturers composing it used the same specifications regarding qualities, grades, sizes, and dimensions.

(2) The same method of payment was required.

(3) Fixed prices and freight rates were agreed upon.

(4) The same permissible percentage of fir mixed with the spruce was agreed upon, generally between 20 and 30 per cent, for the various countries of destination.

(5) There was a general agreement gradually to restrict the supply and to raise the prices.

(6) It was recognized by the Austrian Government, which gave it certain preferences and dispensations in the sale of Government timber.

The method of sale by this syndicate was usually as follows: Generally in March, or as early as February, the various firms sent out representatives who went over the ground with the local timber agent and called on the customers, who were generally the wholesalers. The latter had been prepared since the previous December or November by the timber agent with information regarding prices, percentage of fir allowable, specifications, and the quantity that could be supplied them. It was generally stipulated that the syndicate would not supply all that was demanded, in order to hold up the price to the desired level. The order for shipment was given between May and late September, the syndicate requiring a certain percentage of the contract price in advance. At first this percentage was about 33, but just before the war certain firms that had good credit standing were required to advance only 10 per cent. Orders were then executed, freight space obtained by the broker or the sawmill at the port of shipment, and the goods were shipped by boat, steamer, and sailing vessel. The payment was made on the following basis: Half of the balance still due was paid on cash against documents and the remaining half by 90-day draft payable in Paris, in francs. The timber agent always guaranteed the payment to the syndicate by countersigning the draft and was allowed one-half of 1 per cent discount for assuming this responsibility. The timber agent, therefore, had to know his clientele very well and was required to know where credit could be placed to the best advantage. When the agent refused to countersign these drafts, full cash payment was required. The latter, however, seldom happened. The syndicate did not have a standard price which was the same for all foreign markets, but different countries were charged rates that varied with the strength of the competition. In Italy, for example, a higher rate was charged than in Turkey and Greece, because the higher price could safely compete with American lumber. Prices were always quoted f. o. b. port of embarkation, Galatz. Much of this lumber was purchased on the basis of "wagon" or carload lots. Each wagon contained 22 cubic meters of lumber, which at 424 board feet to a cubic meter, would amount to 9,328 board feet to a carload lot.

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When claims are made in Italy for lumber from any country of origin, the agent or importer is notified and after inspection of the shipment he cables his advice to the shipper. If the shipment is not accepted, arbitration is resorted to. The Italian law states that there must be one or three arbitrators. In case one can not be mutually agreed upon, one is selected by the agent for the shipper, one by the buyer, and the third by these two acting together. The presiding local government court names the third if there is any disagreement in the selection of the third party. There have been, as a matter of fact, very few arbitration cases. At times certain reprehensible practices have been resorted to by the shippers and exporters as well as by the importers.

The importer in Italy generally charges about 20 to 30 per cent above the c. i. f. cost for his profit, the import duty, unloading charges, transportation to car or to storage yard, and general handling. The agent generally receives about 5 per cent commission, including responsibility for payment. He does the chartering of the ships and acts as the mediator between the buyer and the seller.

For timber, the cost for unloading at the port is about 1 lira per cubic meter (about 55 cents per 1,000 feet at the normal exchange rate and at 353 board feet to the cubic meter) when thrown into the sea, which is the cheapest method of unloading. About 1.25 lira (68 cents per 1,000 feet) is the charge for taking the timber out of the sea and loading on the boat, car, or placing in storage. With lumber the cost is more, the average being about 3.50 lira per cubic meter ($1.60 per 1,000 feet, at normal exchange and at 424 board feet to the cubic meter). This cost is greater because the distribution is made on lighters. The dock facilities at Genoa do not generally provide for direct unloading.

[Further details of the handling of the business, the reprehensible methods sometimes pursued, and the difficulties encountered are found in The Export Lumber Trade of the United States, by E. E. Pratt, Miscellaneous Series No. 67, which may be obtained for 20 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from the district or cooperative offices of the Bureau of Foreign and Domestic Commerce.]

The following form of contract is one commonly employed in the exportation of southern yellow pine from the United States to Italy. It shows not only the agreement as to payment for shipment but payment for freight as well. It also shows a sample cargo, the sizes of each kind ordered, the kind of standards or measurements used, and the prices paid. The portions in parentheses are filled in for each contract, the remainder being the regular printed form in English.

Duplicate Contract No. (20).
Codeword (SACA).

Memorandum of agreement made in Turin this (20th) day of (September) 19(15) between (Mr. Arthur Jones) of (Gulfport, Miss.) and (Italian purchaser) of (Leghorn, Italy), whereby the former agrees to sell, and the latter to purchase, the following wood goods of the assortment and at the prices in British sterling, as stated below.

The goods are guaranteed to be of fair average quality of the season's shipments, according to the usual classification and measurements at port of shipment and are deliverable in the usual and customary manner at (a port on the Gulf of Mexico by sailer *Ticino* now on passage from Naples to Sabine Pass, Tex.). The sellers shall not be liable for nonshipment, nondelivery, or delay caused by restraint of rulers, fire, flood, droughts, storms, strikes, combinations, or any extraordinary occurrence beyond their control. In the event of war between any of the great European Powers, or in which the United States of America is involved, sellers to have the option of canceling

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this contract or any unshipped portion thereof. The sellers shall not be responsible for any deviation by reason of the ship returning, losing, or cutting part of the cargo. The word *about* gives shipper a margin of 10 per cent more or less under this contract.

Payment.—The freight is to be deducted from invoice on foreign measure, as customary, and paid by the buyers as per usual charter party, which they hereby agree to adopt; remainder by approved acceptance to sellers', or sellers' agents' draft, payable in (Milan) at four months from date of, and in exchange for, bill of lading and other shipping documents, or in cash less discount at 2 per cent at buyers' option. If goods are insured upon open policy, certificate of insurance shall be accepted by buyers in lieu of policy; war risks are to be included.

For any money advanced by sellers at port of loading for disbursement of vessel or vessels, captain or sellers or sellers' agents are to have the power of drawing on buyers for amount of same at 60 days from date of bill of lading, if a sailing vessel, and 30 days' date if a steamer, payable in (Milan, Italy).

Should any dispute arise through delay in shipment or respecting the fulfilment of this contract, the buyers shall not reject the goods nor refuse immediate payment for same in manner stipulated, but, when due payment has been made, the dispute shall be referred to two arbitrators mutually chosen for settlement, one to be named by each party, with power to name an umpire, who shall decide whether the buyers are entitled to the amount claimed or any smaller sum. The award of the arbitrators or of their umpire to be conclusive and binding, the expense of such arbitration to be equally divided, and the submission shall and may be made a rule of His Majesty's High Court of Justice, on the application of either party. No claim for quality will be entertained on any parcel broken into, nor unless notice is given within 10 days of final discharge.

The prices are on foreign measure and include first cost, freight, and insurance to (Leghorn) or as near thereto as the vessel can safely get and discharge always afloat, lighterage (if any) to be at the expense and risk of buyers.

Should the vessel or vessels fixed for this contract be lost, after being named to buyers, sellers have the option of substituting another vessel or vessels or of canceling the contract. In case of noncompliance by the buyers with the terms of this contract, sellers have power of resale, either by private treaty or public sale, at their option.

[The following sawn long-leaf pitch-pine timber and lumber:

About 200 standards, 6 by 6 inches to 10 by 10 inches, not less than 24 lineal feet average, not less than 11–12 cubic feet average, at 94s. 7d. per load of 50 cubic feet.

About 100 standards, 9 by 10 inches and up; 20 cubic feet average, 18 lineal feet and up, at 101s. 7d. per load of 50 cubic feet.

About 175 standards, not less than 27½ cubic feet average, 90 per cent 11 by 11 inches and up, 18 lineal feet and up, at 109s. 1d. per load of 50 cubic feet.

About 125 standards of "Standard" Genoa-prime lumber, at £19 per standard of 165 cubic feet.

About 25 standards of "Anchor H. P." lumber as per sample, 1, 1½, 2, and 3 inches, at £20 5s. per standard of 165 cubic feet.

The "Standard" Genoa prime to be assorted as follows: About 20 standards, 1 inch; 20 standards, 1½ inches; 30 standards, 2 inches; 20 standards, 2½ inches; 25 standards, 3 inches; 10 standards, 4 inches.

P. S.—Loblolly absolutely excluded in timber and discolored absolutely excluded in lumber.]

Throughout the investigation in Italy complaints have come to the writer from time to time regarding certain practices indulged in by American exporters and others engaged in the exporting and distributing of lumber. There is no question that certain sharp practices have been indulged in both in the United States and in Italy in the importation of lumber. The ignorance of buyers in Italy of grading rules, etc., has been capitalized at times by exporters and shippers on this side. It is believed that lax inspection of these shipments is the channel through which a number of these abuses were made possible. There should be a responsible and authoritative inspection, which would guarantee both to seller and to shipper the necessary protection.

Throughout Italy there is a strong disposition on the part of buyers, whether they are agents or importers or large consumers, to purchase directly from the manufacturer of lumber in the United

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States, as has been the case with lumber coming to Italy from Austria and Sweden. It is believed that many of the abuses made possible under the conditions obtaining prior to the war will be eliminated after the war, and much closer relationships will be established. The Italian customer will know the grades in which American lumber is sold and there will be a better mutual understanding.

If the exporting business from this country to Italy is handled by the manufacturers themselves or by organizations of manufacturers who obligate themselves to rigid inspection and responsibility for their product through the medium of branding, trade-marking, or other means, the exporting business will be developed along the lines of the highest business integrity, so that both the purchaser and the seller should be better satisfied.

During the war there has come about a better general understanding between the Italian and American peoples. There is a desire on the part of the Italians to form closer relationships with Americans and to purchase goods in America and through American agencies, whereas, heretofore, they did business with, or through, German and Austrian houses. American lumber manufacturers can best utilize the opportunity thus offered by an intelligent and tactful and well-directed campaign of advertising of the American product and by insistence on the observance of the highest business principles.

IMPORTING, DISTRIBUTING, AND CONSUMING CENTERS.

Genoa is the great port of entry for lumber coming by sea to Italy. It is the greatest Italian port for all kinds of commerce and the second in importance in the Mediterranean.

The Italian statistical annual for 1915 shows the value of imports of lumber and forest products at various Italian ports for 1914, which is the best index of the relative importance of the various importing centers. Probably over half of the imports of lumber from the United States to Italy in the decade preceding the war entered the port of Genoa, which is one of the most important seaports for southern yellow pine in all Europe, in some years being exceeded in amounts by only Liverpool and London. Other active ports for the reception of American lumber have been Naples, Palermo, Leghorn, and Messina.

The following figures show the value of the imports of forest products at different Italian ports in 1914:

	Lire.		Lire.
Genoa	24,794,000	Ancona	1,866,000
Naples	6,230,000	Leghorn	1,534,000
Catania	5,109,000	Cagliari	1,309,000
Palermo	5,013,000	Milan	1,307,000
Venice	4,197,000	Turin	300,000
Messina	3,454,000	Savona	120,000
Bari	3,053,000		

Other ports at which lumber is occasionally imported are Civita Vecchia, Spezia, Syracuse, Taranto, Castellamare, and Rimini.

The principal consuming centers in Italy are shown in the following list, given in their probable order of importance. There are no official statistics to bear out this relative position of the principal lumber-consuming communities, but this represents the consensus of

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opinion of a number of men well-informed on the subject. The population of each center is also given as a matter of concurrent interest.

	Population.		Population.
(1) Milan and surroundings	867,000	(8) Venice	403,000
(2) Turin and surroundings	753,000	(9) Messina	234,000
(3) Genoa and surroundings	577,000	(10) Catania	382,000
(4) Naples and surroundings	837,000	(11) Bari	405,000
(5) Rome	788,000	(12) Cagliari	206,000
(6) Palermo	552,000	(13) Leghorn	105,000
(7) Florence	670,000	(14) Ancona	320,000

Centers of minor importance in lumber consumption are Udine, Bologna, Piacenza, Vicenza, Verona, Taranto, Padua, Treviso, Parma, Bergamo, Rimini, and Como.

The following statistics from Il Legno Greggio show the points of arrival, by land and sea, of the total imports of common sawed lumber into Italy in 1913 and of the imports of this lumber from Austria, in quintals of 220.46 pounds:

Points of arrival.	Total.	From Austria.
	Quintals.	*Quintals.*
Arrivals by land	5,890,000	5,757,000
Venetia, frontier points	5,600,000	5,591,000
Lombardy, frontier points	276,000	166,000
Piedmont, frontier points	14,000	.....
Arrivals by sea	5,693,000	3,283,000
Ligurian and Tyrrhenian Sea, west-coast, and Ionian ports	2,602,000	579,000
Adriatic or east-coast ports	1,375,000	1,285,000
Sicilian ports	1,582,000	1,334,000
Sardinian ports	134,000	85,000
Total by land and sea	11,583,000	9,040,000

The foregoing table is interesting in that it points out that a major portion of the lumber supply from Austria comes to Italy by rail, the west-coast ports receive far more lumber than do the east-coast or Adriatic ports, Sicily takes much more lumber than is imported to the entire east coast by sea, and Sardinia requires comparatively little imported lumber, the domestic production being almost ample for its requirements.

Inland points such as Florence are served both by land in the case of lumber imports from Austria, and by sea, the nearest port being Leghorn, on the west coast. Rome is served largely from ports on the Adriatic coast in the case of Austrian lumber and from Civita Vecchia and Leghorn and Genoa on the west coast.

Genoa is the greatest distributing center in Italy; from this port lumber is sent to all points in northern and central Italy.

Lumber destined for Sicilian consumption is received principally at Palermo, but considerable quantities are received at Catania and Messina also.

Milan is the principal inland distributing center for both Austrian and American lumber. Several large wholesale firms located in Milan serve the needs of the retail yards throughout the northern Provinces. Trieste was formerly the distributing point for the thickly populated Province of Venetia in the extreme northeastern section of Italy.

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DOMESTIC PRODUCTION AND ITS INFLUENCE ON IMPORTS.

Centuries ago Italy, being a mountainous country, was covered with a good growth of timber. In the higher mountains some of the stands of timber would compare favorably with some of the better types of timber in the United States, excluding the maximum stands of the Pacific coast. Early Latin records show that the entire range of the Apennine Mountains, which extends from the Alps in the north along the entire backbone of the peninsula, was well covered with timber, and even to-day one can find evidence that trees in this original forest grew to a large size in both diameter and height. For example, in the famous Palazzo Vecchio in Florence there are beams 16 by 16 inches to 24 by 24 inches in cross section and up to 70 feet in length, still as sound as ever after having been in use for centuries. This and other evidences of former large forests in Italy are touched upon later in the report.

The production of lumber in Italy has had an important influence on the amount and kinds of lumber imported, and the normal production, combined with the heavy cut to meet the exigencies of the war, will have an even more important bearing upon the demand for imported supplies after the war. With Italy practically cut off from all foreign sources of timber supply during the war, the forests have been cut into much more heavily than ever.

In comparison with other countries it can not be said that Italy is an important timber-producing nation. Its forests were cut down centuries ago, and at present one is greatly impressed, in traveling over the country, with the apparent lack of timber growth on steep hillsides and mountain slopes that normally should be producing good stands of timber. Successive wars not only between nations but between communities for the last thousand years have caused the forests, which had already been largely cut over for building materials, to be burned, and then these lands were grazed by herds of sheep and goats until at present the casual impression is that Italy has no timber at all. However, back from the railroads and other principal means of communication, in more or less out-of-the-way and inaccessible valleys and upper mountain slopes, are found some excellent forests. In the higher ridges of the Alps, adjacent to the frontiers of France, Switzerland, and Austria, are some very good forests of Norway spruce. On the higher elevations of the Apennine Mountains, particularly in the central Province of Tuscany, are found some excellent stands of silver fir, often running as high as 50,000 to 100,000 board feet per acre. Even in the extreme southern end of Italy, in the Province of Calabria, are some excellent forests of silver fir and beech.

On the lower slopes of the mountains, where grazing is too poor or the slopes too steep for agricultural development, are found extensive stands of chestnut and oak, while along the valley streams are found some species of elm, poplar, willow, ash, maple, and birch.

All the tree species found in Italy are different from those growing in the United States. Generally speaking, they are inferior not only in the size of the trees and consequently in the size of the lumber and timbers produced but in the quality of the wood and in the larger number and the greater seriousness of defects as well. That is, an outstanding feature of all of the native lumber is its com-

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FIG. 12.—CLOSE VIEW OF 3 BY 9 INCH BALTIC-PINE DEALS, WITH BRAND STENCILED ON ENDS, SHOWING KIND OF LUMBER, GRADE, AND MILL OF ORIGIN.

FIG. 13.—CABLEWAY ("TELIFERRICO") AT BOSCOLUNGA TO TRANSPORT LOGS FROM FOREST TO SAWMILL. THE SAME METHOD WAS EMPLOYED TO TAKE SUPPLIES TO THE ALPINE FRONT AND TO BRING BACK THE WOUNDED.

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FIG. 14.—BALTIC-PINE 1 BY 4 INCH FLOORING, CLOSELY STACKED IN SHEDS, SHOWING END BRANDING AND UNIFORM SIZE.

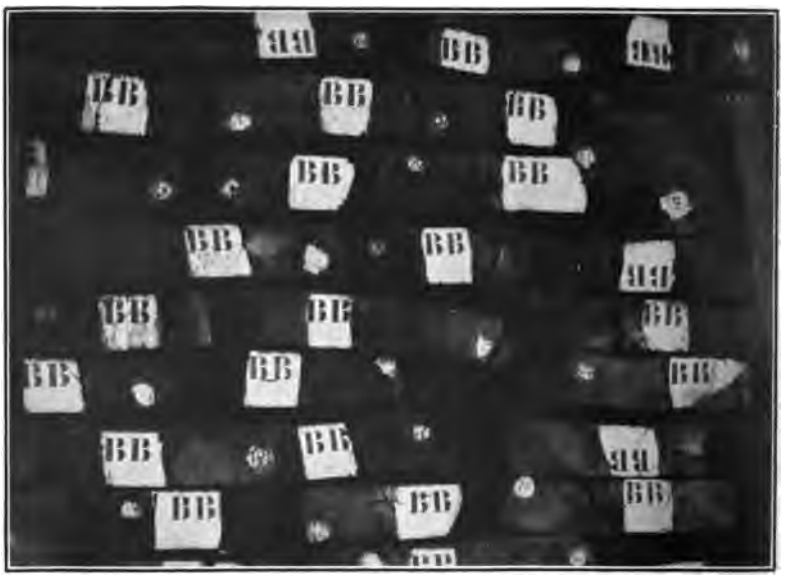

FIG. 15.—FLITCHES OF SLAVONIAN WHITE OAK, SHOWING END BRANDING AND THE USE OF "S" AND "Z" IRONS TO PREVENT SERIOUS CHECKING.

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paratively small width, short lengths, and knottiness as compared with the average lumber produced in the principal forest regions of the United States.

The lumber industry has never been developed to the extent that it has been in the United States, Sweden, or Austria-Hungary. Labor has been so cheap that both logging and milling methods are primitive. Manual labor is employed to a large extent and less machinery and labor-saving devices are resorted to than one finds in the United States.

Italian forests, which ordinarily produced about one-third of the total annual demand for lumber, have been seriously depleted to meet the heavy demands for barrack lumber, trench timbers, barbed-wire entanglement stakes, and the many other special purposes associated with the war. This fact has an important bearing on the character of the lumber that will be needed after the war, as well as its total amount.

FOREST AREA AND ITS DISTRIBUTION.

The total area of forests of all kinds in Italy is estimated by the Italian forestry officials to be 12,564,743 acres, or 18 per cent of the total area of Italy, which is about 70,000,000 acres, equivalent approximately to the combined area of Illinois and Iowa.

Officials of the State Department of Forestry at Rome estimate that 32 per cent of the total area of the country should be in forest. Italy has a much smaller percentage than most of the European countries. Other countries have the following percentages under forest cover: France, 19; Germany, 26; Austria, 27; Russia (European), 36; Sweden, 49; United Kingdom, 4; United States, 29.

The figures for the forest area in Italy were compiled as long ago as 1870 for the committee on real-estate taxation, in collaboration with the Forestry Administration and the Ministry of Agriculture. The forest area has since been reduced somewhat, but reforestation and natural growth have compensated for the forest destruction. The following table shows the area under forest in each of the principal Provinces of Italy, together with the percentage of the area of each Province under forest:

Provinces.	Hectares.[a]	Percentage of area of Province.	Provinces.	Hectares.[a]	Percentage of area of Province
Sardinia	1,045,522	43.11	Venetia	385,671	15.48
Liguria	156,500	29.77	Emilia	335,599	14.66
Tuscany	594,852	26.71	Campania and Calabria	607,008	13.22
Lombardy	461,078	20.68	Abruzzi and Apulia	490,919	12.25
Marches and Umbria	341,415	17.64	Sicily	125,513	4.29
Piedmont	481,816	16.61			

[a] 1 hectare=2.47 acres.

Of the forest area only 3.8 per cent belongs to the Italian Government, whereas 43.2 per cent belongs to the communes, municipalities, and corporate organizations, and 53 per cent is in private hands. A much smaller percentage of the forest growth belongs to the central Government than is the case in most of the countries that have paid

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particular attention to the conservation of their forest resources. Italy is also an exception, especially among European countries, as to the percentage of the total amount of forests still held in private ownership.

These percentages were determined as long ago as 1870, and the Government officials state that with the exception of the forests belonging to the Government little change has been made in methods of handling timber, rate of cutting, or merchandising methods. After 1870 the Government forests at first became smaller in area owing to transfers and sales, but within recent years they have become much larger owing to purchases, and at the present time the total area of forests controlled and managed by the Forestry Department consists of about 477,460 acres. This is exceedingly small in comparison with the National Forests of the United States, which total about 160,000,000 acres and on which there is said to be a net forest area of about 100,000,000 acres.

The following table shows the areas and percentages of forests in each of the so-called forest Provinces divided up according to their distribution into State forests, communal and municipal forests, and private forests:

Provinces.	State forests.		Communal and municipal forests.		Private forests.	
	Hectares.	Percentage of total area.	Hectares.	Percentage of total area.	Hectares.	Percentage of total area.
Piedmont	547	0.1	259,468	53.9	221,801	46.0
Liguria	2,896	1.9	57,507	36.7	96,097	61.4
Lombardy	608	.1	205,530	44.6	254,940	55.3
Venetia	20,300	5.3	249,140	64.6	116,231	30.1
Emilia	13,840	4.1	67,886	20.2	253,873	75.7
Tuscany	35,057	5.9	34,705	5.8	525,090	88.3
Marches and Umbria	23,709	7.0	85,018	24.9	232,688	68.1
Abruzzi and Apulia	33,000	6.7	259,248	52.8	198,671	40.5
Campania and Calabria	58,295	9.6	357,020	58.8	191,693	31.6
Sicily	5,429	4.3	58,574	46.7	61,510	49.0
Sardinia	.....	.....	535,818	51.2	509,704	48.8
Total	193,805	3.8	2,169,916	43.2	2,692,176	53.0

By far the larger proportion of the total forest area of Italy is made up of hardwoods, 4,473,365 hectares out of a total of 5,025,893 hectares. The softwoods, or conifers, cover an area of 374,946 hectares. The mixed forests, or those composed of both hardwoods and softwoods, total 204,582 hectares. The proportions are as follows: Hardwoods, 89 per cent; softwoods, 6.9 per cent; mixed forests, 4.1 per cent.

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The following table shows the division of the forests of each Province into hardwood forests, softwood forests, and mixed forests, with the percentages of each type:

Provinces.	Hardwoods.		Softwoods.		Mixed forests.	
	Hectares.	Percentage of total area.	Hectares.	Percentage of total area.	Hectares.	Percentage of total area.
Piedmont	351,393	72.9	102,185	21.2	28,240	5.9
Liguria	131,418	84.0	9,709	6.2	15,373	9.8
Lombardy	393,914	85.4	39,451	8.6	27,713	6.0
Venetia	279,249	72.4	78,701	20.4	27,721	7.2
Emilia	293,732	87.5	7,892	2.4	33,975	10.1
Tuscany	498,719	83.8	72,208	12.2	23,925	4.0
Marches and Umbria	330,178	96.8	3,573	1.0	7,664	2.2
Abruzzi and Apulia	480,337	97.9	4,980	1.0	5,602	1.1
Campania and Calabria	548,131	90.3	24,533	4.0	34,342	5.7
Sicily	120,832	96.3	4,654	3.7	27	.....
Sardinia	1,045,462	100.0	60	.....	.....	.....
Total	4,473,365	89.0	347,946	6.9	204,582	4.1

These statistics do not indicate in any detail the areas occupied by each of the most important kinds of trees growing in the Italian forests, but an important Italian forestry official has made the following classification, which is, however, only approximate. This table shows the areas covered by commercial stands of the principal species of both hardwoods and softwoods, together with the percentage for each species:

Italian names.	Scientific names.	Common names.	Hectares.	Percentage of area.
SOFTWOODS.				
Abete rosso	Picea excelsa	Norway spruce	181,936	3.7
Abete bianco	Abies pectinata	Silver fir	75,807	1.4
Pino pinastro	Pinus pinaster	Italian pine	86,835	1.5
Pino domestico	Pinus pinea	Italian pine	32,944	.7
Larice	Larix europea	Larch	30,322	.7
Pino laricio	Pinus laricio	Italian pine	24,924	.6
Pino silvestre	Pinus sylvestris	Scotch or Baltic pine	15,161	.4
HARDWOODS.				
Quercia	Quercus	Oak	1,146,163	22.8
Faggio	Fagus sylvatica	Beech	800,000	16.0
Castagno	Castanea vesca	Chestnut	412,000	8.2
Pioppi	Populus	Poplar	80,000	4.6
Ontani	Alnus	Alder	20,000	.4

In addition to the hardwoods mentioned in the table, the following hardwoods enter the markets of Italy: Elm, maple, eucalyptus, mulberry, locust, ash, sycamore, willow, and a few others.

The forest area not included in the foregoing table, amounting to 37 per cent, consists of mixed forests where it was impossible or impracticable to distinguish the proportion of area devoted to the different species or even to the broad classifications of hardwoods and softwoods.

The Italian forest area per capita, according to the latest available figures, is 0.34 acre, as compared with 0.61 acre in France, 0.62 acre

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in Germany, 0.92 acre in Austria, 1.17 acres in Hungary, 0.1 acre in the United Kingdom, 9.7 acres in Sweden, 4.3 acres in European Russia, and 5.45 acres in the United States.

PRINCIPAL SPECIES.

The hardwoods predominate in the Italian forests, both in area occupied and in the variety and quantity of the lumber product. As indicated in the foregoing table, the Italian hardwoods occupy about 89 per cent of the total forest area of Italy. The conifers occupy only 7 per cent of the total forest area and the remainder, or 4 per cent, is composed of mixed forests of both hardwoods and conifers.

Both in the volume and in the value of their products, the oaks are preeminently the most important in Italy and occupy about 23 per cent of the total forest area. There are two white oaks that constitute 70 to 80 per cent of the total oak product. These are the same white oaks that grow generally in western and southern Europe. One of them is of the same botanical species as the Slavonian white oak, which is considered the oak "par excellence" in the hardwood markets of western and southern Europe; the scientific name of this oak is *Quercus pedunculata*. The other oak, the botanical name of which is *Quercus sessiliflora*, makes up the majority of the white oak. The red oak, or cerro, is an inferior kind of red oak and is used for railroad ties, piling, and a few other purposes, but principally for fuel wood. Its grain is coarse and it is very defective. Furthermore, it does not grow sufficiently large to yield good-sized lumber, so that it is not of any great commercial importance. Live oak also is of small commercial importance. In certain parts of the peninsula it is cut and used for railway crossties, posts, rough agricultural uses, etc., but more particularly for fuel wood and charcoal.

Beech is found in the higher altitudes of the mountains and grows particularly on the higher mountain slopes of Tuscany, Calabria, and Liguria. Beech is estimated to occupy about 16 per cent of the total forest area in Italy. Chestnut occupies about 8 per cent but the trees are small, so that their greatest utility is in the production of the annual nut crop, large quantities of which are exported in normal times. There are two kinds of poplar, which occupy about 4.6 per cent of the total area of forests. It seldom reaches a size to compare with the poplars in the United States. Other hardwoods are ash, birch, elm, maple, alder, walnut, eucalyptus, sycamore, etc., which are seldom as large as the hardwoods commonly found in American forests. Most of them are cut and utilized for fuel and charcoal.

Although conifers occupy only 7 per cent of the total forest area of Italy, the silver fir, which is limited to the higher altitudes, grows in splendid, large forests containing in extreme cases 50,000 to 100,000 board feet per acre. Thus, although the area occupied by this tree is relatively small, the production is relatively large, as was shown in the foregoing statistics. In the Alps spruce attains an excellent size and stands of 10,000 to 20,000 board feet per acre are fairly common. The larch is very limited in extent.

The Italian pines, of which there are five, grow generally over all the peninsula at the lower elevations, particularly along the seacoast, but they seldom produce more than 3,000 to 6,000 board feet per acre.

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The average merchantable stand of Italian pine is probably not over 3,000 board feet per acre, so that it does not constitute an important factor in competition with the lumber from abroad. Furthermore, most of these pine forests, since they are generally located in accessible places, have been heavily cut during the war, for munitions, troop barracks, and other military purposes.

The hardwoods generally grow at lower elevations and seldom produce 2,000 to 4,000 board feet per acre. Their greatest utility is for the production of charcoal and fuel wood. Probably half of the total area of Italy's forest is classified as "bosco ceduo," or forests that have been cut over when still young and allowed to sprout up again. In fact, the casual traveler is impressed with the proportionately large amount of sprout, or coppice, forest throughout the peninsula.

The following table shows a list of the principal species found in Italy, together with their scientific names and the common English names, and the specific gravity of each species in both the green and the dry condition:

Italian names and scientific names.	English names.	Specific gravity.			
		Green wood.		Dry wood.	
		Extreme limits.	Average.	Extreme limits.	Average.
Acero fico (*Acer opalus*)	Maple	0.83–1.04	0.94	0.53–0.79	0.75
Acero campestre (*Acer campestre*)	do	.87–1.05	.36	.61–.74	.73
Acero platanoide (*Acer pseudoplatanus*)	do	.70–1.02	.96	.56–.81	.69
Robinia (*Robinia pseudacacia*)	Acacia or locust	.75–1.00	.88	.58–.85	.72
Pero (*Pyrus communis*)	Pear	.95–1.28	1.11	.66–.84	.75
Pioppo tremulo (*Populus tremula*)	Poplar	.65–.99	.80	.43–.56	.50
Betula (*Betula alba*)	Birch	.80–1.09	.95	.51–.77	.64
Melo (*Pirus malus*)	Apple	.96–1.07	1.02	1.71–.73	.72
Faggio (*Fagus sylvatica*)	Beech	.90–1.12	1.01	.66–.83	.75
Cipresso (*Cupressus sempervirens*)	Cypress			.66	.66
Castagno (*Castanea vesca*)	Chestnut	.84–1.14	.99	.60–.72	.66
Tasso (*Taxus baccata*)	Yew	.97–1.10	1.04	.74–.94	.84
Rovere (*Quercus sessiliflora*)	White oak	.87–1.16	1.02	.53–.96	.75
Farnia (*Quercus pedunculata*)	do	.93–1.28	1.11	.69–1.03	.86
Cerro (*Quercus cerrus*)	Red oak	(a)	(a)	(a)	(a)
Leccio (*Quercus ilex*)	Live oak	(a)	(a)	(a)	(a)
Sorbo degli uccellatori (*Sorbus torminalis*)	Sorbus	1.02–1.21	1.12	.73–1.12	.88
Ontano nero (*Ulmus glutinosa*)	Alder	.63–1.01	.82	.12–.64	.53
Frassino maggiore (*Fraxinus excelsior*)	Ash	.70–1.14	.92	.57–.94	.76
Olmo campestre (*Ulmus campestris*)	Elm	.73–1.18	.36	.56–.82	.69
Pezzo or abeto (*Picea excelsa*)	Norway spruce	.40–1.07	.74	.35–.60	.48
Pino silvestre (*Pinus sylvestris*)	Scotch or Baltic pine	.38–1.03	.70	.31–.74	.52
Pino Austriaco (*Pinus austriaca*)	Black pine	.90–1.11	1.00	.38–.76	.57
Pino cembro (*Pinus cembra*)	Cembran pine		.88		.70
Tiglio (*Tilia europea*)	Basswood	.61–.87	.74	.32–.59	.46
Olivo (*Olea*)	Olive			.84–1.12	.78
Platano (*Platanus*)	Sycamore	.78–1.99	.89	.61–.68	.65
Castagno d'India (*Aesculus hippocastanum*)	Horse-chestnut	.76–1.04	.90	.52–.63	.58
Salicone (*Salix alba*)	Willow	.73–.97	.85	.43–.63	.53
Abete bianco (*Abies pectinata*)	Silver fir	.77–1.23	1.00	.37–.60	.59
Noce (*Juglans regia*)	Walnut	.31–.92	.92	.65–.71	.68
Carpino (*Carpinus betulus*)	Blue beech	.92–1.25	1.09	.62–.82	.72

a No figures available.

All the species mentioned in the table are indigenous to Italy except the locust, which was introduced many years ago from the United States and has spread throughout Italy. Eucalyptus from Australia also has been planted with great success. American redwood, white pine, Douglas fir, noble fir, and red oak are other American trees that have been used successfully in reforestation work in Italy.

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FORESTS OF VALLOMBROSA.

In the forests of Vallombrosa, which have been under scientific management for many years, the silver fir was generally cut at about 100 years of age and at that time produced an average of 600 cubic meters or a maximum of 1,000 cubic meters per hectare (2.47 acres). Probably only two-thirds of this, however, would be in board feet, the remainder being contained in the top, stump, and other waste. The beech was cut at 120 years of age and at that time contained an average of 250 cubic meters and a maximum of 500 cubic meters per hectare. Only about half of this hardwood, however, could be classed as lumber. The pines produce about 250 cubic meters per hectare when cut at an age of about 40 years, and a maximum of 300 to 350 cubic meters per hectare. The chestnut produced about 390 cubic meters per hectare at 50 years of age. Only about half of this volume of both chestnut and pine could be classified as lumber, however.

The following table shows the average and maximum heights and diameters for the different kinds of trees found in the forests of Vallombrosa. The diameters were taken at a point 1.30 meters (meter = 3.28 feet) above the ground. No figures were available for the oaks, but it is estimated by officials that they are about the same as those given for beech:

Species.	Age at which cut.	Diameter.		Height.	
		Average.	Maximum.	Average.	Maximum.
	Years.	*Centimeters.*[a]	*Centimeters.*[a]	*Meters.*[b]	*Meters.*[b]
Silver fir	100	35	45	30	38
Beech	120	35	45	22	27
Chestnut	50	35	40	16	20
Pine	40	20	25	15	20

[a] 1 centimeter=0.3937 inch. [b] 1 meter=3.28 feet.

In regard to the number of trees per acre, it was determined as result of the measurement of a large area that there was an average of 160 silver-fir trees per acre at maturity, 160 beech, and 320 pine. All these trees grow in pure forests.

ANNUAL PRODUCTION BEFORE THE WAR AND DURING 1918.

Statistics of lumber production in Italy are not officially compiled either by any governmental agency or by associations interested in obtaining such figures. In comparison with conditions that obtain in the United States there is a great lack of statistics bearing upon this subject. The following estimate as to the total annual production of lumber and other wood products in Italy has been based upon the compilation of estimates made by Government officials, lumbermen, timber owners, etc. An informal compilation has been made by Italian forestry officials.

Before the war it was estimated that the production of lumber in the softwood, or coniferous stands of timber, amounted to about 3 cubic meters per hectare (about 515 board feet per acre) per annum. Figuring the area of softwoods at 447,929 hectares the annual pro-

duction of softwoods would amount to about 1,300,000 cubic meters (551,000,000 board feet). This total is divided approximately as follows: Norway spruce and silver fir, 700,000 cubic meters (297,000,000 board feet); pine (several species), 550,000 cubic meters (233,000,000 board feet); larch, 50,000 cubic meters (21,000,000 board feet).

It is estimated that the production of hardwoods per hectare was much less, or about 2 cubic meters per hectare (about 345 board feet per acre) per annum. Based upon the total area of 2,558,163 hectares of large merchantable forest the hardwood production of all kinds would amount to about 5,000,000 cubic meters, of which it is estimated that 1,500,000 cubic meters (636,000,000 board feet) was utilized for lumber, crossties, and timbers and associated forest products, and the remainder, or about 3,500,000 cubic meters, was devoted to the production of charcoal and for use as fuel wood. The hardwood production was divided about as follows: Oak (several species), 800,000 cubic meters (339,000,000 board feet); beech, 250,000 cubic meters (106,000,000 board feet); chestnut, 200,000 cubic meters (85,000,000 board feet); poplar, 120,000 cubic meters (51,000,000 board feet); other, 130,000 cubic meters (55,000,000 board feet); total, 1,500,000 cubic meters (636,000,000 board feet).

It is estimated that the greater part of the oak lumber production was employed by the Italian State railways for railroad ties. The hardwoods classified under "other" consist principally of the following species, in the order of their commercial importance: Ash, alder, maple, elm, sycamore, locust, eucalyptus, and birch.

The mixed forests are generally exceedingly poor in quality. They have been constantly cut over for fuel wood and even more or less burned and grazed over until their condition is very poor. They consist largely of young sprout forests, which are cut over from time to time for fuel and rough agricultural purposes such as wagon stock and vehicle parts. It is estimated that an average of about 3 cubic meters of wood per hectare is produced from these forests. From the total area, therefore, of mixed and cut-over forests not included in the foregoing hardwood and softwood classifications, which is in area 1,356,750 hectares, there were annually produced an average of about 3 cubic meters of fuel wood per hectare; this would yield a total of about 4,000,000 cubic meters of fuel wood. The production of fuel wood from the hardwood forests was about 3,500,000 cubic meters, while the production of fuel wood from softwood forests amounts to about 2,000,000 cubic meters. The total production of fuel wood on all kinds of forests in Italy consequently would amount to about 9,500,000 cubic meters. It is estimated that about 6,000,000 cubic meters of this total amount was converted into charcoal, while about 3,500,000 cubic meters was employed directly in the form of fuel wood. The fuel problem has been serious during the war and, with the normal imported supply of coal shut off, Italy has had to depend upon the forests for a large share of its fuel supplies.

The latest detailed figures for the production of charcoal in Italy refer to the year 1906. In that year the production is given as 5,070,000 quintals (1 quintal = 220.46 pounds). Considering charcoal to be about 20 per cent of the original weight of the wood that produced it, it must have required 2,535,000 metric tons of wood to produce this quantity of charcoal.

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The following figures show the 1906 production of charcoal in Italy by Provinces:

	Quintals.
Venetia	383,000
Lombardy	147,000
Piedmont	258,000
Liguria	186,000
Total, Northern Italy	974,000
Emilia	164,000
Tuscany	828,000
Marches	86,000
Umbria	391,000
Latium	400,000
Total, Central Italy	1,869,000
Abruzzi and Molise	142,000
Campania	569,000
Apulia	129,000
Basilicata	88,000
Calabria	213,000
Total, Southern Italy	1,141,000
Sicily	671,000
Sardinia	415,000
Total, Italian islands	1,086,000
Grand total	5,070,000

The overcutting of the native forests to supply the needs of the Army has been serious. On the State forests alone, it is estimated, little, if any, cutting can be allowed for a period of 12 to 20 and possibly more years. The cutting on the private forests also has been serious, in order to meet the demands of the war situation, to attempt to make up for the lack of the normal imported supplies, and to take advantage of the rise of 200 to 800 per cent in the market price of lumber. Consequently it is believed that the normal domestic production of about 2,800,000 cubic meters will have to be made up from foreign sources after the war. The normal production of 9,500,000 cubic meters of fuel wood has increased vastly during the war. No figures are available as to the total amount of wood cut for fuel in Italy during 1918, but it is believed that the figure reached 15,000,000 to 20,000,000 cubic meters.

FORESTRY PRACTICE.

Forestry in Italy has not developed to the extent that it has in France and Germany, but in spite of the severe handicaps of small forest area, impoverished condition of the forests, and meager financial support, Italy has made distinct progress in forestry in recent years. Its poor forests are the result of the former long-continued strife, internal dissensions, neglect of the forests as an important resource, and general abuse of the economic structure of the country by the successive dominant influences of Austria, Spain, and France for several centuries. The forests have suffered not only by severe overcutting but by overgrazing and by careless burning as a result of continued neglect.

Forestry in Italy is largely in the hands of the central Government at Rome. There is a well-organized and active Department of Forestry in the Ministry of Agriculture. The State, however, owns only 477,460 acres, which represents only 3.8 per cent of the total forested area of the country. Italian officials estimate that the State should control 50 per cent or more of the forest area, and that instead of a forest area of only 17.64 per cent of the area of the country, Italy should have at least 32 per cent of its area in some form of timber growth. Italy, however, has been literally too poor to make adequate provision for forest lands, as the country received a heritage of heavy debt from the various kingdoms, duchies, and papal States that made up the present kingdom prior to 1870.

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Forestry in Italy began in 1869, with the establishment of the first State forests and the Royal Forestry Institute at Vallombrosa. Italy now has State forests scattered generally throughout the peninsula, a well organized and supported Royal Forestry College at Florence, and two ranger schools.

Italy made great progress in its forestry program from 1910 to 1912, when new laws were enacted to put the forests on a much more substantial and better supported basis. The annual appropriations were increased in 1912 from $300,000 to $1,000,000.

Forestry in Italy has obviously received a great setback by the conditions brought about by the war. In the first place, about 1,000,000 acres of forest have been destroyed at the front, and many forests heavily overcut for military purposes. Furthermore, the water-power possibilities of Italy, on which its industrial future is largely dependent, are closely associated with its forest activities, because the forests, to a certain degree, at least, determine a uniform run-off and stream flow from the mountains that serve as the watershed for hydroelectrical properties.

Italy needs to engage in reforestation on a large scale after the war, particularly on the high mountain areas at the battle front. Even during the war the areas cut over for war purposes were immediately reforested, the labor of many Austrian prisoners being used for this purpose.

The following figures show the receipts and expenditures in 1914–15 of the Italian Forestry Department in connection with the State forests:

	Lire.
Receipts:	
Raw products	1,286,546
Manufactured products	22,881
Total receipts	1,309,427
Expenditures:	
Ordinary—	
Imposts and taxes	292,654
Personnel	297,888
Maintenance	219,875
Extraordinary—	
New construction	101,683
Reforestation	214,461
Topographical surveys	1,016
Accidents	13,084
Unforeseen expenses	7,710
Total expenditures	1,148,371

METHODS OF LOGGING, GRADING, SAWING, AND STORING.

An opportunity was afforded to visit some of the largest logging and sawmill operations in Italy through the courtesy of the Italian Minister of Agriculture, the Director General of Forestry, and other forestry officials. Generally speaking, both woods operations and sawmill work impress one from the United States as being rather primitive in method. The Italian lumber industry has not been developed to the point that it has been in this country or in other important lumber-producing countries. The supply of forest products is limited and the price is high in Italy as compared with coun-

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tries of large forest areas. The whole industry is characterized by the employment of manual labor, by careful and accurate methods of manufacture, and by the complete utilization of the product.

The largest lumber operations are conducted in the silver-fir forests of Tuscany and the holdings belonging to the Government. These were being rapidly converted into much needed lumber, crossties, trench timbers, stakes for barbed-wire entanglements, duck boards, bridge timbers, and a great variety of other wood products needed at the front or in the housing and movement of a great army.

LOGGING AND SAWING.

The largest sawmill operation in Italy was at Boscolunga in the Province of Florence, along the crest of the Apennine Mountains. The topography was so rough that the logs were hauled by oxen from the point of felling to a central log dump. Here they were picked up by an overhead cableway system, shown in the accompanying illustration, and conveyed directly to the sawmill. On shorter hauls oxen were employed to transport the logs directly to the sawmill. On other operations both gravity and water chutes were employed to bring logs directly to the sawmill or to some central point from which they were conveyed to the sawmill by overhead cableway. The areas of silver fir were being cut clean and every part of the product was utilized, the tops going into small poles and stakes. Fuel was so high that it was profitable even to gather the fagots and transport them some distance to market. At the largest operation there were 450 men working in the woods at one time. These were men skilled in the work and detailed from the Army for these special purposes; they continued under military regulations.

In many cases after logging the areas were cleared of all available material, defective log and larger branches and even stumps in some cases being converted into charcoal. On other operations forests were being cut which before the war were so inaccessible that the timber could not be cut and placed on the market at a price to compete with the lumber imported from Austria or the United States.

The sawmills are very similar to some of the smaller stationary mills or good-sized portable mills in the United States. The one at Boscolunga was equipped with four gang saws, three of Swiss manufacture and one of German origin, and three circular saws arranged on saw tables for edging by hand. The output of the largest sawmill in Italy, operating night and day, with 40 men and boys and 12 women working in two 10-hour shifts, was 150 to 180 cubic meters (64,000 to 76,000 board feet). The women were used to haul away and stack lumber, to carry away refuse, and for odd jobs about the mill in which there was comparatively little danger and less physical effort. The larger output per day was obtained when railway crossties and timbers were being cut, whereas the smaller output was obtained when sawing "through and through." On the night shift only 25 men and boys and 6 women were employed, a smaller number being required because the motor trucks used in hauling away the lumber were not loaded at night and only the larger logs were sawed. The lumber was sent directly by horse trucks to the yard about a mile away along the main haul road, where it was reloaded onto motor trucks and sent about 25 miles to the nearest railway point. These

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motor trucks carried 6 cubic meters (2,500 board feet) to the load. There were 22 trucks altogether employed in transporting the product from the mill at Boscolunga to the railway and 1½ trips were made each day. It was largely a downhill haul from an elevation of 1,388 meters at the mill location down to an elevation of 150 meters at the railway. The total cost for gasoline, labor, repairs, tires, depreciation, etc., ran from 2 to 2½ lire per kilometer or roughly 43 to 54 cents per mile at 13.5 cents to the lira. It requires 0.35 to 0.45 kilo of gasoline per kilometer.

At the shipping point freight cars had an average loaded capacity of 18 to 22 cubic meters each.

The old sawmill of Vallombrosa was one of the most interesting features of the forest and it was an exceedingly busy place during war time. It was originally placed here by the Benedictine monks about 200 years or more ago, and until recent times was operated entirely by a water wheel. This mill had a normal capacity of 16,000 to 21,000 board feet per day of 10 hours. However, when beech was sawed only 10,000 to 12,000 board feet were cut per day. During the war, the mill ran in two shifts, except at the rather frequent times when the scarcity of labor caused a lack of logs.

The mill was built entirely of stone. Instead of the conventional log pond familiar on the larger operations in the United States, a small truck was loaded in the log yard and moved by hand into the mill. The mill was equipped with two gang saws, one of German and the other of Swiss manufacture. The former had 15 saws in the gang frame and the latter 12 saws. The German saw made 190 strokes per minute, while the Swiss saw made 200 per minute. There were also two circular saws running 1,900 revolutions per minute, for edging and trimming. The kerf of the Kirchner saw was only 2½ millimeters, which is far less than that of saws used in this country; consequently there was much waste. The sawmill manager estimated that 30 per cent of the logs that came to the mill was waste, that is, sawdust, slabs, edging, bark, etc. However, in contrast to conditions in this country, none of this was actually wasted. The sawdust was burned as fuel or made up into briquets and sold in the neighboring communities. The slabs, trimmings, and other edgings were converted into charcoal in the sawmill yard, and the smaller edgings, bark, etc., were used for fuel purposes.

About 20 men and 20 women were employed in the mill and in the mill yard. The sawyers received 8.30 lire per day, the other men 6.75 lire, and the women 3.65 lire per day. The working hours were from 7 to 12 in the morning and from 1.30 to 6.30 in the afternoon. The women were served with lunch, in addition to their pay, by the officials. During the winter time, the water turbine was resorted to entirely, whereas during the summer, owing to the lack of sufficient water flow, electric power was used from Pontassieve in the Arno Valley. A 60-horsepower motor was employed for the latter purpose.

Silver fir normally was seasoned for 8 to 10 months before shipment, whereas during the war no regular seasoning was done as the demand for lumber was so urgent that it was even used green. It is estimated that the cost of sawing silver fir before the war was between $0.70 and $1 per cubic meter, whereas it was considerably higher during 1918.

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The sawing costs, however, were kept down on account of the mills running to full capacity nearly every day and the complete utilization of the product.

As noted above, the fir lumber was used for barracks and general war purposes. The best clear stock of beech was used for airplane propellers and for oars, the remainder being used by the Navy and for trench timbers, railway and artillery purposes, etc.

The lumber product from this forest was transported by motor truck to Pontassieve, the nearest point on the railway, about 12 miles distant. Six cubic meters of fir, or approximately 2,500 board feet, was considered a load, whereas only 4 cubic meters of beech, or 1,700 board feet, of this heavier wood was transported in each load. Two round trips per day were made in the winter and three during the summer when the roads were in better condition.

Whereas lumber is dried several months before shipping to markets in normal times, at this time the demand for material was so great that the lumber was generally being shipped green to the point of consumption.

The average shipping weight for silver fir in the log was estimated to be 800 to 900 kilos per cubic meter, whereas fresh-sawn lumber weighed 650 to 750 kilos per cubic meter. The air-dry weight of the same material varied between 450 and 480 kilos per cubic meter, depending generally upon the size of the lumber or timber involved; that is, the smaller the lumber, the lighter the weight and vice versa.

GRADING.

There are no generally accepted or printed grades for lumber produced in Italy. The classification of various kinds of lumber, even in normal times, is not at all standardized and there is considerable confusion and dissatisfaction. In wartime no attempt whatever was made to classify the lumber product, except that the very best qualities of clear stock in silver fir and spruce were segregated and sent to airplane plants for further inspection and seasoning. A large part of the sawing is done to order and the sizes as they go from the mill are separated and piled together.

In normal times dimensions are often used as a basis for the first classification and these vary with each wood. There are commonly three to five different classifications for each wood according to size, and each district or Province frequently has its own method of classification. The classification, however, may even vary within a given Province or district. Classification is also made according to quality and freedom from knots and other defects. Nearly every lumber-manufacturing operation has its own distinct rules. Each mill, therefore, has developed a reputation for the general character of its output, in the region where its product is marketed, and purchases are made on the basis of this rough classification. In case of a dispute, an arbitration committee or agent is appointed.

There is great confusion in connection with grades not only in the domestic lumber trade but in the import trade as well. One is immediately impressed by the general lack of knowledge of grading rules as applied to American yellow pine, red gum, white oak, etc., as well as to the Austrian lumber product. In fact, the only

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persons in all Italy who seemed to have any definite idea of grading-rules for imported lumber were the larger importers, agents, and merchants.

A lack of standardization, of commonly accepted grading rules, and of any printed rules or information on the subject has given rise to great confusion in the lumber trade throughout Italy. This situation makes the country an opportune field for well-directed advertising of American grading rules so that not only the merchants, importers, and agents will be acquainted with the basis on which American lumber is classified and graded but the retail merchant will be able to buy and sell more intelligently than he has heretofore and the ultimate consumer will know the lumber that he handles.

The fact that American lumber is graded according to definite rules and is sold on that basis is an excellent talking point in favor of the more extensive introduction of the American product on the Italian market. With each piece of lumber branded to show not only the grade of the individual piece of lumber but the species, the degree of manufacture, and the mill that produced it, American lumber would be sold much more readily. It would be advisable also to have the grading rules translated and distributed in foreign countries that are or could be developed into good markets for American woods.

CHARACTERISTICS AND PRICES OF INDIVIDUAL SPECIES.

Silver fir is cut in considerable quantities in Italy, especially along the high mountains of the Apennine range and in the high regions of the Alps and Calabrian Mountains in the extreme south. It furnishes material for the common lumber used for the most ordinary purposes. This fir is used with Italian spruce and with spruce and fir from Austria and Roumania. It is usually offered on the Italian market as "abeto," under which name Italian spruce and Austrian spruce and fir also are sold. Owing to this situation, it is necessary for the purchaser to examine carefully the kinds of lumber he is buying. Within the Italian lumber trade it is generally considered that silver fir is somewhat stronger, heavier, harder, and more close-grained than Austrian spruce. However, it is more difficult to work, owing to these qualities, and is likely to check and split. There is also a greater tendency for the knots to become loose than in the case of the spruce. In durability it is about the same as the spruce. It is never used in contact with the ground nor where it is likely to decay readily.

Italian fir prior to the war was used in the larger interior cities, particularly Florence, Bologna, and Rome. It was obtained in larger sizes and wider than the Baltic pine or spruce, being cut during the war from trees about 100 years of age, grown on the large State and private forests, such as Vallombrosa, Camaldoli, and Boscolunga.

Italian fir was used principally for floor beams, rafters, scaffoldings, roofing supports for heavy tiling, cheap furniture, windows, frames, and doors, cores for veneered furniture, and packing boxes in the northern part of Italy. In some places it is used for shelving and interior trimming. It is the cheap common lumber of Italy and is employed for nearly every purpose for which wood is suitable and for which a particular figure or finish is not required.

In price the Italian fir normally undersells Austrian spruce, bringing 50 to 60 lire per cubic meter ($23 to $27 per 1,000 feet), according

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to size and freedom from defects. There are no universal grading rules for this species. Each lumber manufacturer sells it on the basis of his reputation in the local markets. It is sometimes classified into two or three grades along very rough lines and is often sold mill-run.

Italian spruce is the same kind as that imported from Austria, which constituted probably 70 per cent of the total imports of lumber into Italy. It is the same wood as that sold in the English market as whitewood from the Baltic countries. Owing, however, to unfavorable conditions of the locality where it is grown in Italy, the lumber is generally inferior to imported fir and spruce, being small and very knotty. Only comparatively small amounts are produced annually and it comes only from the higher elevations of the Alps and a few places in the higher regions of the Apennine Mountains. Italy is the extreme southern limit of the growth of this spruce (*Picea excelsa*), which is found in large forests in Norway, Sweden, Germany, and Austria. It is seldom separated from Italian fir, with which it usually appears and is sold on the Italian market, bringing the same price. It is used for the same purposes as the Italian fir.

There are five distinct species of pine in Italy and each has different uses and characteristics. However, the different species are sometimes used without reference to the purposes to which they are best suited and often find their way to the ultimate consumer as "abeto," the common name applied on the Italian market to Austrian spruce as well as to Italian fir and spruce, although the pines do not resemble the fir or spruce in color, weight, or texture. One of these pines (*Pinus sylvestris*) is the same as that produced in Sweden, Finland, and the Baltic countries generally, prominent in the English and French markets as redwood, and also called Scotch pine, Baltic pine, red pine, and various other names. In quality, however, the Italian wood is greatly inferior to the pine from the Baltic countries. In Italy the pines in the order of quantity produced are as follows: *Pinus maritima* or *pinaster*, *Pinus pinea*, *Pinus laricio*, *Pinus sylvestris*, and *Pinus cembra*.

The first three pines resemble certain varieties of the pines of the Lake States and of the western States of the United States. The wood of the maritime pine is somewhat pitchy in texture and more or less soft and workable but the trees are so small that the lumber produced is very poor and is not suitable for many purposes. It is used considerably in mining operations for props, stulls, and lagging, as well as for packing cases, crates, box boards, and other construction work. It grows along the seacoast throughout Italy and at the lower elevations in the interior. This is the same maritime pine that grows in the Landes region of France and in Spain and Portugal.

Pinus pinea is a wood of fairly good quality, which has been used in shipbuilding both for ribbing and for ship masts and keels in smaller vessels, and for outside framing and sheathing. In the north it is also utilized for packing boxes and cheap furniture. It grows only along the seacoast and is often referred to as the Italian pine. It lends a very picturesque effect to the landscape and has been often described in connection with the scenes about Rome and Naples.

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Pinus laricio most closely resembles the southern yellow pine but is not so strong nor so heavy as the long-leaf pine. It grows only in Calabria and it is the hardest and strongest of the Italian pines. It is used principally for ship masts and spars and ship planking, for bridges and other construction work, and for telegraph and telephone poles. Prior to the war it served practically the same purposes as long-leaf pine.

Pinus sylvestris grows only in the high mountain regions of Lombardy, Venetia, and Piedmont. Technically it produces the finest lumber of the five Italian pines from the point of view of the Italian lumbermen. It is highly regarded on account of its soft, even texture, workability, and straight and even grain, but in its small size and knottiness it is inferior to the Baltic pine of the north, which is botanically the same species.

Pinus cembra grows only in the Alps along the Swiss and French frontiers. It is used for wood carvings, particularly for antique framing, for which a considerable quantity of wood is demanded in Italy. This wood is often used also as a base to be covered with a cement or plaster facing. It is excellent in meeting the demands for wood carving because of its soft and even texture and its freedom from checking, which is common with a large number of species in the hot, dry climate of Italy.

The following table shows the five Italian pines in the order of quality and the prices obtained prior to the war and during the summer of 1918. Conversions have been made at 19.3 cents and 13.5 cents to the lire for pre-war and 1918 prices, respectively, and at 424 board feet to the cubic meter.

Italian pines.	Prices before the war.		Prices in 1918.	
	Lire per cubic meter.	*Dollars per 1,000 feet.*	*Lire per cubic meter.*	*Dollars per 1,000 feet.*
Pinus sylvestris	60- 80	27-36	300-400	96-127
Pinus laricio	50- 60	23-27	200-250	64- 80
Pinus pinaster or maritima	20- 25	9-11	150-200	48- 64
Pinus pinea	20- 25	9-11	150-200	48- 64
Pinus cembra	100-120	46-55	100-120	32- 38

The failure of the last-named pine to advance materially in price is explained by the fact that there is very little demand for it, as it is adapted only to wood carving. Its limited quantity is an important factor in its general use.

Italian larch (*Larix europea*) is the same as the larch that grows over central Europe in very limited quantities. Its commercial production is limited to a very few locations in the Italian Alps. It produces a hard, heavy, tough, and strong wood, similar to long-leaf pine, and is used for the same purposes for which the long-leaf pine is imported from the United States. "Larice," as it is called, has been very heavily cut during the war and it is unlikely that it will serve the purposes that it did prior to the war, on account of the exhaustion of the timber in the Alps. Consequently the supply for the Italian market formerly met by this wood will have to be made up from other countries, and preferably from the United States, as

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no other tree in Europe produces a wood to meet the same requirements. Before the war larch brought 60 to 80 lire per cubic meter ($27 to $36 per 1,000 feet), depending upon the size and quality.

Four kinds of oak in Italy are commercially important. The principal one, which probably furnished between 70 and 80 per cent of the total oak lumber supply, is called rovere (*Quercus sessiliflora*) and is similar to the American white oak, being heavy, fine-grained, strong, and tough. It finds its principal use for fine furniture and imitations of antique furniture, for fine flooring, interior decorations of railroad cars, ships, fine wine staves, casks, and carriages and wagons. The inferior trees of this species are used for railroad crossties and for piling and a number of other purposes. This is the Italian white oak of commerce, which was an important factor in supplying the great demand for white oak prior to the war. Owing to its exhaustion during the war, Italy should be in the market for American white oak to replace it.

The second oak of importance in Italy is locally called "farnia"; its scientific name is *Quercus pedunculata*. This is the same oak as the Slavonian white oak from Austria, but its production is so limited that it is commonly mixed with the other white oak (rovere) and sold with it. This oak, on account of unfavorable conditions of growth, does not attain the size and character that it does in Slavonia. Occasionally lumber from selected trees is separated and sold for high-grade furniture, parquetry flooring, shipbuilding, interior finish, and furniture. Before the war this oak sold for about 200 to 250 lire per cubic meter ($91 to $114 per 1,000 feet), along with the other Italian white oak.

The third Italian oak of importance, locally called "cerro" (*Quercus cerrus*), is a red oak of very inferior quality that grows throughout the country. The fact that this native red oak is so poor in texture is an important factor in causing the Italian consumers to be prejudiced against the imported red oak. The Italian red oak is not only inferior in size, but it is exceedingly coarse-grained and generally presents an unfavorable appearance. Italian lumbermen are inclined to look upon American red oak as being of the same general character as their own and it has been difficult to prove to them that the American wood is far superior to the Italian.

On account of its small size and poor quality the Italian red oak is used for railroad crossties after being subjected to preservative treatment and also for rough bridge work, second-quality spokes and staves, and rough work where a better wood is not required. A large part of the red oak cut in Italy is utilized for fuel wood, for which it is excellently adapted. In connection with the prejudice existing against all red oak as a result of the poor quality of the native species, Italians generally regard the red oak from Styria as inferior. Of all the attempts to import red oak from Austria, practically none has been successful up to the present time. Even in seasoning quality the Italian red oak is exceedingly inferior to the American red oak, as it dries with difficulty and checks very easily. It commanded a price of 30 to 40 lire per cubic meter ($14 to $18 per 1,000 feet at the normal exchange rate) before the war, while during 1918 it was as high as 60 to 100 lire per cubic meter ($19 to $32 per 1,000 feet at 13.5 cents to the lira), on account of the depletion of the native timber supply.

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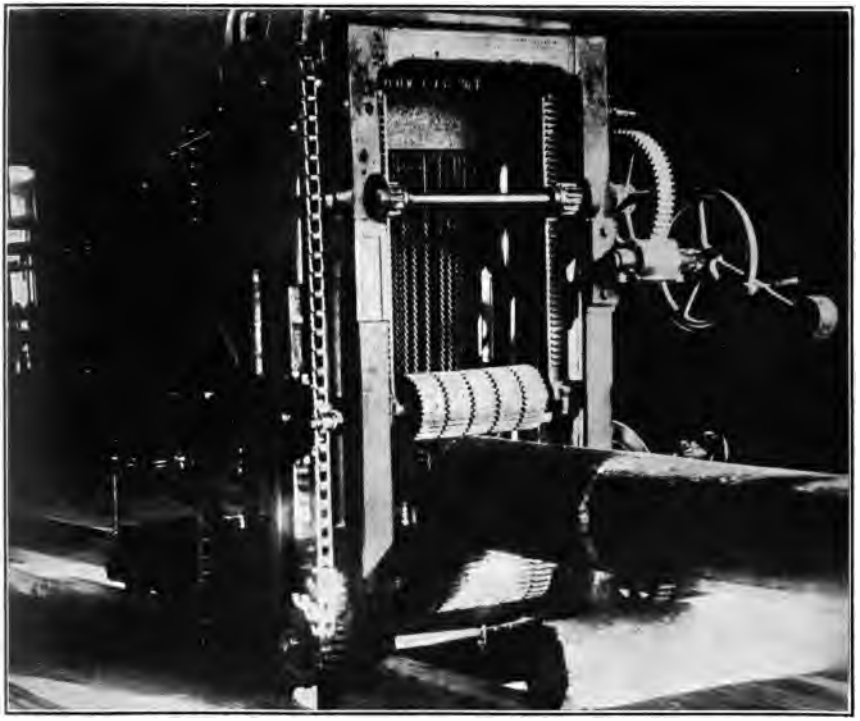

FIG. 16.—TYPICAL INTERIOR OF A SAWMILL IN ITALY, WHERE PRACTICALLY ALL LUMBER IS CUT BY GANG-FRAME SAWS.

FIG. 17.—THE END PILING COMMON IN ITALY; THIS IS LARGELY ITALIAN POPLAR.

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FIG. 18.—METHOD OF DRYING MATERIAL FOR LEMON AND ORANGE BOXES AT A LARGE BOX FACTORY IN CATANIA, SICILY.

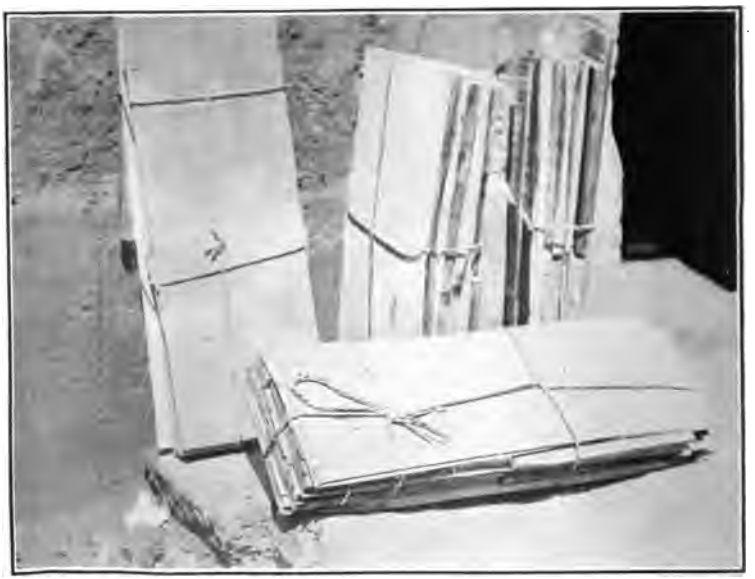

FIG. 19.—BUNDLES OF SHOOKS CONTAINING SUFFICIENT MATERIAL TO MAKE TWO BOXES. BOX FACTORIES FREQUENTLY SHIP THEIR PRODUCT IN THIS FORM TO THE LARGE FRUIT-PACKING ESTABLISHMENTS, WHERE IT IS ASSEMBLED.

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The fourth Italian oak placed on the market occasionally is referred to as leccio. This is known scientifically as *Quercus ilex*. It is a live oak and very similar to the live oak in the United States in that it is exceedingly hard, heavy, tough, and durable. A comparatively small quantity of it reaches the lumber markets. It is used mostly for automobile and wagon spokes, general vehicle stock, machinery, tools, and armory stock. Generally this live-oak tree is small, so that on the basis of quantity the wood is used chiefly for fuel. It brought only 30 to 40 lire per cubic meter ($14 to $18 per 1,000 feet) for the best quality prior to the war.

The Italian chestnut grows in all parts of Italy, but chiefly in the northern and central parts and up to 2,000 feet above sea level. It is locally known as castagno, and its scientific name is *Castanea vesca*. It produces a wood that is more durable, harder, and stronger than that of the American chestnut, which it very closely resembles in external appearance. The chestnut forests of Italy are regarded as being more important for their nuts than for their wood. This is readily understood when the chestnut forests are seen, for the trees are exceedingly small and are allowed to grow bushy in order to produce the nut crop. The trees are certainly not grown principally with the object of producing the best-quality lumber, as is true of the silver-fir and spruce forests. In 1918, 800,000 tons of chestnuts were collected to help meet the grave food situation in Italy. Two-thirds of this amount was utilized for chestnut flour.

Most of the chestnut wood used goes into telegraph and telephone poles and high-power conduit poles. Chestnut is also used for furniture, staves, window casings, framing, tools, cores for veneered furniture, and other purposes. Most of the old furniture exported has a chestnut core with a walnut or mahogany veneer. Old chestnut beams may be found throughout Italy, especially in the old cathedrals and castles. Chestnut brought 80 to 90 lire per cubic meter ($36 to $41 per 1,000 feet) before the war, and in 1918 it commanded a price of 200 to 400 lire per cubic meter ($64 to $127 per 1,000 feet). Its supply will have been completely exhausted and chestnut will have to be imported from the United States to serve the demand formerly met by the local Italian chestnut.

Two kinds of poplars are grown in Italy. Both are generally called pioppo on the markets, although one is distinguished as gattice (*Populus alba*) and is much superior to the other. Its wood is not like the American yellow poplar but is very similar to the Carolina poplar and the cottonwood of the lower Mississippi Valley. The wood is somewhat harder than that of the cottonwood and has entered into the Italian airplane construction during the war. It is used for interior trimming, frames, doors, core stock, cheap furniture, woodenware, toys, etc., and was highly esteemed for interior airplane framing and for boxes and crates and match stock. It brought about 60 lire per cubic meter ($27 per 1,000 feet) prior to the war, and during 1918 sold as high as 200 to 300 lire per cubic meter ($64 to $96 per 1,000 feet), depending upon the quality.

The other poplar, the scientific name of which is *Populus nigra*, has a much softer, weaker, and lighter weight wood, which is generally inferior to that of the other poplar. Its principal use is for wood props. It is also used for packing crates and general cheap-lumber

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purposes, but the total quantity is so small that it is almost negligible commercially. Prior to the war it brought only 40 lire per cubic meter ($18 per 1,000 feet at the normal exchange rate), but the demand was so great during the war that the price rose to 150 lire per cubic meter ($48 per 1,000 feet at 13.5 cents to the lira), or even more for the better quality. Sometimes these two poplars are distinguished as white poplar and black poplar, the better one being the white, which was highly esteemed for interior airplane framing and for the manufacture of boxes and crates. It was also used for match stock.

The Italian ash, or frassino (*Fraxinus excelsior*), which grows along streams throughout the country, is very similar to the ash grown in the United States in texture, color, and general properties. The war demand for it has been heavy and it has been largely exhausted. It is likely that American ash will be sought to supply the demand satisfied by the local ash prior to the war. Ash entered prominently into airplane construction for the main support between the wing beams of the planes and for framing purposes in the body or fuselage. Prior to the war it was extensively used for car construction in both railroad and trolley cars. During the war it entered prominently into the manufacture of artillery carts, munition wagons, gun carriages, and machinery. Prior to the war it brought 180 to 200 lire per cubic meter ($82 to $91 per 1,000 feet at the normal exchange rate and at 424 board feet to the cubic meter), while during the summer of 1918 it was as high as 600 to 1,000 lire per cubic meter ($191 to $318 per 1,000 feet at 13.5 cents to the lira), but good-quality Italian ash was not obtainable at any price.

Another variety of the Italian ash (*Fraxinus ornus*) was of comparatively little importance. It grows much smaller than the other ash and its wood is distinctly inferior. It was very difficult to obtain ash in large sizes owing to the fact that both kinds of ash in Italy grow comparatively small and they seldom grow in large forests; consequently the lumber furnished was knotty and defective and seldom of the kind desired in airplanes, etc.

The Italian walnut (*Juglans regia*), called noce, is regarded very highly throughout Italy as a cabinet wood. In color and general appearance it occupies a position midway between the American black walnut and circassian walnut. It is used for high-grade furniture and cabinet work, and also for the same purposes as mahogany and black walnut in the United States. It grows throughout Italy, but more particularly along the streams. It finds its chief uses for fine furniture, cabinet work, and flooring and is also used for fine carvings and the most expensive forms of interior finishes. It is very highly regarded for wood-carving and inlay work, and some of the finest examples of old carvings, which one finds everywhere in Italy in the cathedrals, public buildings, and palaces, are walnut. Prior to the war it brought 250 to 300 lire per cubic meter ($114 to $137 per 1,000 board feet), whereas in 1918 it was hardly obtainable at any price and no market price was given. The war program has made serious inroads upon the native supplies of this tree and it is likely that American red gum, mahogany, oak, etc., will supply a large share of the demand formerly met by this walnut.

Of Italian maple there are very limited quantities, and it is seldom found in the Italian lumber yards. Only a few yards supplying the

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highest grades of lumber carry it. It is not nearly so common a kind of lumber as in American markets nor in such common use as in the eastern sections of the United States.

There are three varieties of Italian maple, all of which are commercially referred to as acero. In external appearance and characteristics, as well as in technical properties, the Italian maple closely resembles the American soft maple. The scientific names of the three varieties found in Italy are as follows: *Acer pseudoplatanus, Acer platanoides,* and *Acer opalus.* It grows throughout Italy and is found up to 3,000 feet in elevation in the lower mountains. It is used mostly for fine finishings, paneling, handles, etc., and to a limited extent for parquetry flooring and expensive designs. Some American hard maple was imported into Italy and met with great favor and it is likely that American maple can be introduced to fill the limited demand to take the place of the Italian maple, which is practically exhausted. It brought 90 to 100 lire per cubic meter ($41 to $46 per 1,000 feet) prior to the war.

A number of other hardwoods are found on the Italian market, but most of them are used for special purposes, and the total amount of these annually produced from the Italian forests is so small as to be almost negligible. However, they are all interesting because the markets that they supplied will have to be stocked from foreign sources, as they have been sold out during the war. Elm, which is very similar to the American elm, is used principally for hubs, wagons, common carriages, artillery stock, spokes, mallets, and a variety of other purposes where a hard, heavy, tough wood is required. Elm brought 80 to 100 lire per cubic meter ($36 to $46 per 1,000 feet) prior to the war. It is commonly known as olmo, and there are three varieties, which are very similar in general characteristics, as follows: *Ulmus montana, Ulmus campestris,* and *Ulmus effusa.*

Basswood (*Tilia europea*), commonly known as tiglio, is also found to a very limited extent in northern Italy and Tuscany and produces a very soft, lightweight wood similar to the American basswood. It is used principally for wood carvings, frames, antiques, and Florentine designs. It brought 80 to 85 lire per cubic meter ($36 to $39 per 1,000 feet) under normal conditions. There was none available during 1918, and it is likely to be some time before it will appear again on the Italian markets.

Cypress, although not a hardwood, is sometimes sold along with the hardwoods, as is the case in the United States, although the two cypresses are different. The Italian cypress resembles the incense cedar of the northern Pacific coast in many of its characteristics. It grows generally over Italy. It is very tall and lends a distinctive appearance to the Italian hills along the Ligurian coast. It produces a soft, light-colored, straight-grained, and workable wood, which has a very distinct odor, pleasant, but rather strong. The wood is used very much like the eastern red cedar of the United States, for high-grade linen chests and in closets where odors protect against moths and other insects. It is also used for fine interior woodwork, and serves excellently to keep away wood-destroying insects. It brought from 60 to 80 lire per cubic meter ($27 to $36 per 1,000 feet) prior to the war, whereas in 1918 it was bringing 160 to 180 lire per cubic meter ($51 to $57 per 1,000 feet, at 13.5 cents to the lira). It

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is likely that American cypress could be introduced for many purposes that the Italian cypress formerly served. Many individual trees of this species that otherwise would be in the market have been exhausted to meet the heavy demand made for lumber during the war.

When locust, or "acacia" (*Robinia pseudacacia*), which is a native only of the United States, was introduced into Italy many years ago, it was widely planted throughout the country. One can now find it growing in nearly all sections of Italy and it is occasionally cut for wheels, wagons, vine poles, grape stakes, etc. Alder is used for woodenware, boxes, and other purposes. It is cut to a considerable extent in the south.

Eucalyptus has been widely planted in Italy, having been introduced from Australia. It is used for railroad ties and largely for fuel wood. A little birch, locally known as betula (*Betula alba*), is found to a limited extent in the Alps of northern Italy and is used for handles, machinery, tool stock, etc. A little apple, olive, and sorbus wood is used for decorative purposes, woodenware, etc., but its total quantity is not sufficient to affect materially the imports of lumber from foreign sources.

COMPETITION WITH IMPORTED LUMBER.

Before the war the lumber produced in Italy offered considerable competition with imported lumber, not only in quantity but in individual species. The total domestic production of lumber and associated forest production for fuel wood was about 1,000,000,000 board feet. This amount is equivalent to the total amount annually imported under normal conditions. It is believed that between 500,000,000 and 600,000,000 board feet of this domestic production was lumber and timbers, the remainder being poles and piling, railway crossties, grape stakes, wood used for distillation purposes, staves, and a great variety of miscellaneous products.

The domestic white oak, which was the principal local lumber produced, offered serious competition with American white oak. Local beech competed with red gum, although rather unsuccessfully, and the local larch, silver fir, spruce, and pine with Austrian spruce, American southern yellow pine, and Baltic pine. Larch produced in the northern Alps competed directly with southern yellow pine, as it was very similar in appearance, strength, structure, and general characteristics. Locally produced poplar competed somewhat with American hardwoods, such as yellow poplar, cottonwood, and tupelo gum.

The local lumber production in Italy, which was an important factor prior to the war, since it supplied approximately one-half of the country's needs, has been practically exhausted by overcutting for the war program and for fuel purposes. Consequently, this serious deficiency must be made up by increased imports in the future. There will be an opportunity for further imports of American hardwoods to supply the needs formerly served by local beech, ash, poplar, chestnut, maple, elm, etc.

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EFFECT OF OVERCUTTING ON FUTURE PRODUCTION.

The special cutting for war purposes has already been dealt with to a limited extent in treating the subject of lumber from several of its aspects. It is likely that the domestic production of lumber in Italy has increased from two to three times the pre-war figure. Almost every accessible tree that could produce lumber was cut for war purposes and the smaller forests were heavily cut for fuel.

So great was the demand that practically all consumption of lumber not directly associated with the war program ceased during 1918. Probably the greatest consumption of lumber in Italy's war program was for barracks, in the camps at or near the front and in the various training camps scattered over the peninsula and where successive advance and retreats along the front meant recurring demands for lumber. Aside from barracks, vast amounts went for trench purposes and timbers and boards for dugouts, for bridging temporary locations, for camouflage supports, etc. It is estimated that over 20,000,000 stakes and barbed-wire entanglements alone were annually needed in Italy during the war. The forests along the mountain front were destroyed by artillery fire, and wood was taken for the Army's needs for fuel, as well as for other purposes. In many places on the high mountain front—from 6,000 to over 9,000 feet high—considerable quantities of lumber had to be hauled from the interior, the local supply being exhausted, because it was used in tunnels, for ammunition stores, temporary dressing stations and hospitals, garages, bridge timbers, etc. It is estimated that 1,000,000 acres of forest have been destroyed along the Italian front, either by shell fire or by cutting for military purposes.

Shortly after Italy entered the war, in May, 1915, heavy cutting of the forests was begun in the north along the mountain front, and and as these supplies became exhausted, the forests farther and farther south were resorted to until the transportation problem became difficult. First, the preserves of Venetia, Lombardy, and Piedmont were cut, then the forests nearest to shipping centers throughout Tuscany, Emilia, and Liguria in central and northwestern Italy, and finally the forests of the south in Abruzzi, Calabria, and Sicily. Although there is a greater quantity and variety of hardwoods than softwoods in the Italian forests, the softwood timber is by far the larger and better wood for lumber and timber requirements. First the best hardwoods were taken, then the medium class, and finally almost anything that would produce material of the desired size. Except as the order of cutting was modified from time to time by transportation difficulties, the spruce in the north was utilized first, then the silver fir in such famous forests as Vallombrosa, Camaldolia, Siena, and other points in Tuscany, then the pine along the Italian Riviera and other points along the west coast, and finally the oak, beech, and chestnut along the lower slopes and smaller hills. The disaster of Caporetto in October, 1917, gave the Austrians the richest and best supply of spruce in the high Alpine Mountains, and it is reported that the spruce forests, which were the most important sources of Italian domestic supply, have been heavily cut and to a large extent destroyed.

During the war the Government established the right to requisition timber for war purposes. This was the only way, in fact, to get it,

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since the private owners were the largest holders of timber preserves and they would be unwilling to sell, because they could make enormous profits by holding their stumpage, owing to the rapidly rising prices. The Government established a fixed price, which was only about 50 per cent of the full market value.

The scarcity and consequent high cost of fuel in Italy have had a very serious effect on the sparse remaining forests. The fuel problem is a serious one in Italy, even in normal times, because there is practically no coal and the greater part of the supply was imported from England and the Westphalian fields of Germany. High freight rates, lack of ship tonnage, and excessive rates of exchange and insurance caused the price of coal to rise rapidly. Cardiff coal increased in price from about $10 per ton on board cars on west-coast ports in Italy in January, 1915, to $36 in January, 1916, and around $80 in 1918. Anthracite and coke increased in price proportionately. Petroleum and its products were obtainable only in the United States and rose from 200 to 500 per cent above normal levels. No private motor cars were allowed to operate.

This condition resulted in greatly stimulating the production and output of the lignite mines, particularly in the lignite beds of Tuscany, and in the severe cutting of all available and accessible forests not large enough to yield lumber, poles, piling, crossties, and other material needed for the war program.

Most of the cooking in Italy is done with charcoal, of which there is normally a heavy production, and the use of young growing timber to supply the requirements for charcoal has been a serious factor in preventing the further growth and development of the native Italian forests. This already bad situation has been made worse in war times.

Few furnaces for heating purposes are used in Italy, open fireplaces and stoves serving instead. Great quantities of wood have been substituted for coal in both fireplaces and stoves. In addition, many industries and even railway locomotives, formerly dependent upon imported coal, have been compelled to use wood fuel.

The annual consumption of wood fuel in Italy has increased at least 100 per cent since 1914. Young and partly mature forests have been sacrificed to meet the demand, and also fruit trees, old olive orchards, and sometimes roadside trees. Special stoves and grates have been developed in northern Italy to utilize sawdust, and all waste materials remaining after the extraction of oils, as well as rice hulls, bark, peat, wood waste, etc., were utilized to the fullest extent.

In Florence, the wholesale cost of charcoal increased from about 12 lire ($2.32) per quintal of 220 pounds in July, 1914, to 40 to 55 lire ($5.50 to $8.50, at 13.5 cents to the lira) per quintal, depending upon the size and kind, in the fall of 1918.

In the same place, which is representative of average conditions prevailing in Italy, the wholesale cost of wood fuel advanced from 4 lire ($0.77) per quintal in July, 1914, to 12 to 15 lire (about $1.60 to $2) per quintal in the fall of 1918.

The following dispatch, issued at Rome about September 1, 1918, illustrates forcibly the seriousness of the wood-fuel situation:

"In order to check the dangerously rapid consumption of the wood supply, the use of sawn wood for other purposes than those of transport and of the industries necessary for war has been prohibited.

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"Regulations are laid down for the use, in conjunction with wood, of coke, lignite, and peat wherever these are available, and small cut wood mixed with charcoal is advised for domestic cooking. The measure is designed to save unnecessary transport, as well as to economize the supply, but it will mean many cold houses in Italy this winter."

It is likely that the Italian forests, as a result of overcutting, will be able to supply but a negligible quantity of lumber for 15 to 20 years or more after the war, whereas before the war about 50 per cent of the total annual lumber requirements of Italy was supplied from the native forests.

LUMBER EXPORTS.

While Italy is a considerable importer of forest products, owing to the disappearance of its forests centuries ago, the statistics of lumber movements show that Italy also exports certain forms of forest products to other countries. Throughout Europe even the countries of large lumber and wood imports export wood goods and products.

Investigations of this situation disclose the fact that there are local movements of lumber and forest products, which are dependent upon low freight tariffs, local trade movements, and certain features of the market, advantage of which can be taken in spite of the fact that the countries at large are great importers of the same class of commodities. For example, France is a considerable importer of wood goods, but in normal times considerable quantities of box lumber and shooks were sent from the important forest region of the Landes in southwestern France to the near-by north coast of Spain for packing and shipping sardines, preserves, soap, etc. In the same way Italy has imported certain forms of forest products from France and Switzerland, which are themselves importers of these commodities, and has sent out more or less lumber and wood materials to Spain, Tripoli, Tunis, and Algeria, and even Greece.

During the war, in spite of the lack of imported lumber and the scarcity of local supplies, Italy sent considerable quantities of materials to Egypt and Palestine for the British Army operating there, as well as to Greece and the Baltic States.

The following figures show the value of the total exports of wood and wood manufactures from Italy for the years 1911 to 1918, the results for 1918 being provisional: 1911—65,272,864 lire; 1912—67,355,808 lire; 1913—67,023,850 lire; 1914—47,561,542 lire; 1915—52,330,904 lire; 1916—49,009,726 lire; 1917—40,460,028 lire; 1918—37,956,162 lire.

The following table shows the quantity and value of the exports from Italy of round or hewn logs and of squared and sawn lumber from 1911 to 1918. The round or hewn logs, 80 to 90 per cent of which was hardwoods, were sent, in part, to Egypt, Tunis, Tripoli, France, Spain, and even Argentina. Before the war the squared and sawn lumber was mostly hardwoods; during the war it was mostly softwoods.

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Years.	Round and hewn logs.		Squared and sawn lumber.	
	Metric tons.	*Lire.*	*Metric tons.*	*Lire.*
1911	8,656	237,640	11,801	1,180,100
1912	8,236	576,520	44,551	4,677,855
1913	4,522	330,106	34,902	3,664,710
1914	4,638	338,574	16,038	1,764,180
1915	773	89,668	5,449	926,330
1916	191	28,650	2,721	593,178
1917	67	16,080	4,396	1,538,600
1918	14	3,360	2,004	701,400

The following table shows the quantity and value of the exports of squared and sawn lumber from Italy to various countries for 1915 and 1916 and the quantity only for 1917 and 1918, the value by countries not being available for those years:

Countries.	1915		1916		1917		1918	
	Met. tons.	*Lire.*	*Met. tons.*	*Lire.*	*Met. tons.*	*Lire.*	*Met. tons.*	*Lire.*
Albania	150	25,500	86	18,748	2,647	(a)	.....	.....
Eritrea	749	127,330	751	163,718	304	(a)	1,122	(a)
France	243	41,310	170	37,060	17	(a)	71	(a)
Greece	.....	.....	106	23,108	1,124	(a)	15	(a)
Italian Somaliland	53	9,010	113	24,634	4	(a)	.....	.....
Tripoli	3,657	621,690	387	84,366	61	(a)	546	(a)
Tunis	158	26,860	99	21,582	(a)	(a)	(a)	(a)
All other countries	439	74,630	1,009	219,962	245	(a)	250	(a)
Total	5,449	926,330	2,721	593,178	4,402	1,538,600	2,004	701,400

a Not available.

The following table shows the quantity and value of the exports of staves (largely chestnut) from Italy to various countries for 1915 and 1916 and the quantity only for 1917 and 1918, the value by countries not being available for those years:

Countries.	1915		1916		1917		1918	
	Met. tons.	*Lire.*	*Met. tons.*	*Lire.*	*Met. tons.*	*Lire.*	*Met. tons.*	*Lire.*
Argentina	26	4,290	97	17,169	.....	.....	.....	.....
France	2,756	454,740	3,654	646,758	2,158	(a)	2,811	(a)
Greece	18	2,970	255	45,135	(a)	(a)	(a)	(a)
Spain	12,155	2,005,575	18,331	3,244,587	14,042	(a)	10,056	(a)
Tunis	401	66,165	644	113,988	(a)	(a)	(a)	(a)
United Kingdom	50	8,250	434	76,818	(a)	(a)	(a)	(a)
All other countries	121	19,965	342	60,534	601	(a)	1,114	(a)
Total	15,527	2,561,955	23,757	4,204,989	16,801	3,780,225	13,981	3,145,725

a Not available.

The following table shows the quantity and value of the box boards exported from Italy for 1911 to 1918, the figures for 1918 being provisional:

Years.	Quintals.	Lire.	Years.	Quintals.	Lire.
1911	2,564	107,688	1915	8,486	424,300
1912	4,017	168,714	1916	5,362	294,910
1913	4,060	170,520	1917	3,053	198,445
1914	2,556	112,464	1918	2,664	173,160

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The considerable advance in the exports of box boards in 1915 was due to the fact that 5,658 quintals were sent to Egypt for munitions and other war purposes.

Italy normally sends to Argentina considerable walnut, which the Italian colony in that country like to use for furniture, flooring, etc. In addition, Italy exports high-grade parquetry flooring ready to set up at destination. Artistic Italian furniture of the highest grades is well known in the furniture trade of the world and commands an exceedingly high price, particularly in England, France, Argentina, and the United States. Modern artistic furniture and antique designs, as well as imitation antique designs, are exported from time to time both to South America and to southern Europe. (See p. 121.)

USES AND TREATMENT OF LUMBER.

The structures in Italy differ noticeably from those in the United States. Owing largely to the passing of the native Italian forests as a source of building material centuries ago, and the lack of good transportation facilities from remote districts where lumber and timbers could be obtained, Italy has been compelled to rely upon the native stone, marble, and granite and materials from which to make brick, tile, cement, concrete, plaster, etc., an abundance of which is generally available.

Through long custom there has been developed a predisposition among the Italian people to put up buildings that will last not only for a generation or so, as in this country, but for several hundred years. Their dwellings and structures generally have an atmosphere of permanence not so apparent in this country, where many buildings are of frame construction and are more or less temporary by way of comparison with most of the structures in European countries.

A sharp contrast of climate, that is, the cold biting winters and the long hot summers, particularly in Sicily and the southern Provinces of Italy, has caused the people to build structures that will afford protection from the heat in summer and from the cold winds in winter. The thick masonry walls afford protection of both kinds; they render the homes cooler in summer and they retain the heat better in the winter time.

The per capita consumption of lumber and forest products in Italy is far below that of the United States and Canada, where there has been a great abundance of native forest wealth. The scarcity of lumber is the greatest single reason for its high cost on the markets and there is a definite relation established between the cost of wood and the cost of other construction materials, such as iron, steel, concrete, brick, stone, tiling, and plaster.

Frame buildings are found only in the northern Alps, in forested regions where wood is abundant and comparatively cheap. One occasionally sees temporary structures built of wood, especially about large industrial enterprises and new building activities. Bathing pavilions on the beaches are commonly built of wood, as in this country. The city of Messina, in Sicily, which was destroyed by the disastrous earthquake in 1908, has been rebuilt largely with frame dwellings and it is probably the only city in southern and western Europe where so many wooden buildings can be seen together.

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Messina has 30,000 wooden structures, of which 5,000 and one large hotel were built by American assistance and were constructed with American lumber, chiefly southern yellow pine. The rest are constructed largely of Austrian spruce.

The foregoing discussion might lead one to believe that the opportunity for developing the Italian market in the use of lumber is rather limited. Lumber enters, however, to a considerable extent into the construction of all buildings in Italy—chiefly for doors, windows, frames, flooring, floor beams, roofing support, and interior trim; and Italian imports of lumber have increased markedly in the last few decades. Many other industries and lines of usage demand large quantities of lumber, the chief of which are car construction, railway materials and crossties, general millwork and fixtures, furniture, ship and boat building, vehicles and vehicle parts, agricultural and other machinery, airplanes, mining, boxes and crating, musical instruments, woodenware, tools and handles, patterns and flasks, and a great variety of other purposes for which wood has demonstrated itself to be better suited and more satisfactory than any other material.

In general building operations, stone, concrete, and brick are usually the chief materials for foundations, walls, and partitions, and brick for finishing door and window openings and topping walls. Floors in the larger municipal buildings are supported by light iron I beams, while in the smaller buildings, and usually in dwellings, the floor is supported by wooden beams suitable spaces apart. Moldings, baseboards, cornices, steps, and door and window sills are often done in cement or plaster, as well as in wood. In many public buildings and more pretentious structures are elaborate interior woodwork and paneling. Roofs are almost always covered with red tiling, but this is so thick and heavy that the actual amount of wood required to support the roofs is probably much more than is required in both the support and the wood-shingle covering as well, in the dwellings of the United States. To a certain extent, the same analogy is borne out in the case of flooring, where large heavy wooden beams, across which are laid lighter wooden beams, are used to support the heavy tiling used for floors in some of the buildings.

Windows usually require much more wood than in the United States. They are generally of the long French kind, and consequently are large and of the double-folding, swinging type. Then there are usually solid wooden swing doors inside the window to shut out the light in the summer, as well as to assist in retaining the heat in the winter, and, thirdly, there are the outside shutters to allow air and partial light to enter the room.

In agricultural and rural districts farm barns are often a part of the house, or at least consist of a lean-to or a room or two adjoining the living quarters. Very little lumber is used about the farm. One never sees the wooden walks or fences or the frame sheds or barns common in the United States. Floors are often of earth, stone, or tile. Unthrashed grain and hay are frequently stacked in the open air.

There is a distinct tendency to use less wood per capita in southern Italy than in the northern sections. In portions of the south, especially in rural districts, the inhabitants live in very primitive fashion and occupy homes that their ancestors have lived in for 100

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to 300 years or more. There is little building activity in many of the smaller communities, the population of which has often remained stationary for many decades. However, quite the reverse is true in many of the large communities, particularly in industrial centers and their environs, where not only new industrial and manufacturing structures are being built but many new homes and where the statistics show that the population is steadily increasing with the development of industrial enterprises.

Many building activities have been curtailed or stopped during the period of the war, and large amounts of capital have been tied up awaiting the coming of peace to engage in extensive building operations that will require large quantities of imported lumber.

UTILIZATION OF DIFFERENT KINDS OF LUMBER.

In other portions of the report more or less information has been given regarding the use of the individual kinds of imported lumber, but they may be summarized as follows:

AMERICAN WOODS.

American long-leaf or southern yellow pine has reached a place of considerable importance on the Italian lumber market since its first entrance to Italy in the year 1867. It is held in much greater esteem than in the United States, and is highly regarded particularly for its attractive grain and figure, which is considered beautiful by many Italian wood-using establishments, and for its durability, strength, hardness, straightness of grain, and excellent seasoning qualities. On account of its greater strength and larger size, southern yellow pine can be used in place of woods with which it enters into competition, such as Austrian spruce, which is much softer, weaker, and more perishable.

The utilization of American yellow pine, which goes by the common name of pitch pine in Italy, as well as throughout Europe, naturally divides itself into the following five categories:

(1) General construction. Probably the largest share of the imports is used for floor beams, flooring, roofing, rafters, factory construction, bridge timbers, mine and railway construction work, etc.

(2) Car construction, especially freight and second and third class passenger cars. Considerable quantities are also required for trolley cars, and express, sleeping, and baggage coaches.

(3) General millwork, such as interior trim, doors, particularly those used for exterior finish, counters, woodwork, store and office fixtures, and furniture. Wherever woodwork is exposed to the weather, soil, and open air, southern yellow pine is the favorite wood.

(4) General ship and boat building.

(5) Miscellaneous purposes where strength, hardness, and durability are required, such as agricultural and electrical machinery, tools, vehicle stocks, and motor-truck bodies.

A large share of the imports of southern yellow pine in the past has been in the form of timbers. A rough approximation of the various classes of stock would be about as follows: Timbers, 6 by 6 inches and up, 65 per cent; deals and lumber, 25 to 30 per cent; flooring (kiln-dried saps), 5 and 10 per cent.

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The comparatively large percentage of timbers is due to the Italian custom of wanting to import large sizes and then work them up to suit local and individual requirements. Nearly all the timbers are cut to the local metric measure, and there is an almost entire lack of standardization of lumber products, such as sizes in doors, window frames and sash, flooring, and furniture. It is sometimes difficult even in the United States to standardize some of these forms of lumber products, and in Italy there does not seem to be even an approximation toward this desirable end.

American long-leaf pine is used for practically the same purposes as the native larch; in fact, it is sometimes called "larice d'America," which, literally translated, means larch of America. The usual common name applied to this wood, however, is pitch pine. It can not very well be said that long-leaf pine competes with the native larch, because there is so little of the latter, and it has been so heavily cut during the last four years that it is unlikely to interfere with the further entrance of American general-construction woods on the Italian market.

The principal competition offered to southern yellow pine was the Austrian spruce, but lumber users generally regard yellow pine as far superior, and a more or less sharp distinction was made between the two kinds of lumber. For example, the cheapest forms of flooring, doors, general woodwork, floor beams, rafters, etc., were of Austrian spruce, whereas the better classes of these same lines of usage were supplied by southern yellow pine. When the market price for southern yellow pine declined it was used for many purposes for which Austrian spruce had been used, and vice versa.

There has been a distinct tendency in the past in the direction of greater prosperity in Italy and a desire for better classes of both private and public buildings. Improvements were being demanded continually. This fundamental desire for better things has had a direct bearing on the character of lumber that was in demand. After the immediate demands of the reconstruction period in Italy are met, it is likely that better classes and qualities of lumber will be required. Probably, therefore, much greater quantities of Douglas fir and southern yellow pine will be required in the years following the reconstruction period, which will demand more or less cheap lumber to meet the immediate need.

American red gum has gained rapidly in favor on the Italian lumber markets. It is probably as well known in Italy as it is even in the United States. Over 8,000,000 feet annually has recently gone to Italy from this country and the wood will probably have a good future in Italy on account of its attractive grain, its pleasing color, workability, adaptability for many uses, and comparative cheapness. There is a sharp distinction between the heart and the sap gum, the latter being called hazel pine and the former satin walnut throughout the European markets. The Italian name for it is "noce satin."

Red gum is used for the same general purposes as Italian walnut and serves as a substitute for it. It is sometimes stained to imitate the Italian walnut. Its greatest single use is for furniture, especially for cabinets, desks, and tables; but it is also widely used for fine store and office fixtures, paneling, interior trim, and miscellaneous

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woodwork. A good portion of the Italian walnut furniture made in recent years has red-gum interiors. It can be conservatively predicted that both the quantity and the variety of use of this lumber will continue to be broadened in the future. It is very popular on the hardwood markets.

American white oak has entered and assumed considerable importance on the Italian lumber market, and it has competed successfully with Slavonian oak from Austria and with Italian white oak. Attempts have been made to introduce American red oak on the Italian markets, but it did not meet with a favorable reception because there was an unfounded prejudice operating against it. The local Italian red oak called "cerro," is very inferior, and the American red oak, because of its resemblance to cerro, was thought to be the same kind of wood. By intelligent and skillful methods of exploitation and advertising this ill-founded prejudice can readily be removed and it is likely that American red oak, as well as white oak, can be exported to Italy.

American white oak has been used for furniture, car construction, interiors of ships, interior trim, parquetry flooring, vehicles, and machinery stock. A fairly large quantity of this oak has been used for imitation antique furniture in the Tuscan furniture factories.

A large opportunity exists to develop trade in American white oak in Italy. The local white oak has been practically depleted as a result of the overcutting during the war and Slavonian oak will be exceptionally high in price and a large share of its production will doubtless be required in the industries of Austria and Germany.

It is unfortunate that some American white oak sent to Italy has not been representative. On account of being wormholed some shipments met with an unfavorable reception by some very prominent users of white oak in Italy, and this unfavorable reputation must be wiped out by American white-oak manufacturers. They can easily demonstrate, however, that the white-oak product of the United States is of at least as high a quality as that from Austria or Japan or Italy, and is probably better for many purposes. In the future the excellent qualities of American white oak will doubtless be demonstrated, to the advantage of American lumber manufacturers.

Other American woods have come to Italy and have met with a favorable reception. Only a start has been made in the case of most of these woods and it is likely that the market for them will develop.

Douglas fir has been imported and used for ship timbers, airplane wing beams, ship spars, and for the same purposes for which southern yellow pine is used. Those who have tried it out in their establishments are enthusiastic about the excellent qualities of this wood, and although it is not so generally well known as southern yellow pine, its reputation has developed rapidly and it is believed that it will enter the Italian lumber markets in continually increasing amounts, provided, of course, it can be laid down at the Italian ports at prices to compete with other woods.

Small amounts of American hickory and white ash have been imported for vehicle, tool-handle, and other special purposes. Many inquiries have been made for both these woods, and although the total imports are not likely to be very large, a profitable business can no doubt be developed in them.

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Small quantities of American cottonwood, tupelo gum, yellow poplar, maple, California sugar pine, and white pine have been imported into Italy. Although only a small start has been made in the case of most of them, they are all well liked and inquiries have been made regarding them in the principal Italian lumber markets. Most of them are more or less specialized woods, in so far as the Italian market is concerned, but the demand for them is likely to broaden. The extent to which they will be sold will depend largely upon the initiative, enterprise, and skill with which the market is developed.

AUSTRIAN WOODS.

Austrian spruce, locally known as "abete" in Italy, includes 10 to 30 per cent of silver fir, which is sold under the same name and is used for the same general purposes. In fact, both these woods are used indiscriminately and interchangeably with the Italian silver fir and spruce, as well as the local pines. All are used for the common cheap lumber of the country and find their principal uses for cheap flooring, interior doors, window framing, sash, blinds, floor beams, rafters, and roof sheathing.

Between 80 and 90 per cent of the total imports of lumber from Austria is made up of spruce and fir, which are the great general-purpose woods of Italy. Aside from the general purposes mentioned, they are used for packing boxes and crating, cheap furniture, cores for veneer work, cheap fixtures, toys, woodenware, concrete work, temporary structures, scaffolding, and, in fact, for nearly every purpose for which wood is employed.

The Austrian lumber may be characterized as being soft, weak, brittle, perishable, and more or less defective in the way of knots, pitch streaks, checks, and wane. It seasons poorly in the hot, dry climate of Italy, with severe checking as a natural result. It resembles very closely the Adirondack and Canadian spruce of eastern North America. In some parts of the Italian market, local lumbermen regard Italian silver fir as superior to that imported from Austria and to Austrian spruce. The fir is somewhat harder, tougher, more brittle, and less workable than the spruce, but the distinctions in general are so slight that the two woods are sold generally at the same price and for the same general purposes and are often mixed.

Slavonian oak is regarded as the oak "par excellence" in the Italian as well as as in the French and English markets, where it is broadly sold and used. It is particularly regarded for its workability, soft, even texture and grain, uniformity in color and character of wood, freedom from defects, and quiet, conservative figure. The imports have been gradually decreasing, owing to the fact that the native supply in Austria is rather limited and its cutting has been closely guarded; consequently this oak commands a high price and its cost has mounted to such a figure that American white oak and even Japanese white oak have been imported to compete with it. Its chief use in Italy is for car construction, particularly in first-class passenger coaches, street cars, and sleeping and restaurant cars. It is also used for fine furniture and parquetry flooring, paneling, wood carving, interiors of ships, fine fixtures, and interior trim and finish.

The car-construction factories like wood free from all defects, if it is possible to obtain such lumber, and are willing to pay high prices

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to get Slavonian oak of high quality. It has recently risen to such a high figure, however, that car builders and engineers are anxious to obtain oak from other countries, if it can be had in sufficiently good qualities and at prices not too high.

Austrian beech is the only other wood imported into Italy from Austria in large commercial quantities. In appearance, characteristics, and general qualities it closely resembles the beech of the northern hardwood forests of the United States. Owing to the fact that Italy has considerable beech of its own, however, local requirements are served largely by domestic production. The Italian and Austrian beeches are identical, the scientific name being *Fagus sylvatica*.

Austrian beech is used in Italy principally for railway crossties and for box boards in the Sicilian lemon and orange trade. A miscellaneous amount is also used in bentwood stock, carriage and wagon shafts, oars, kitchen utensils, woodenware, handles, common furniture of the lowest grade, machinery, toys, and tools. On account of its likelihood to twist, warp, and shrink and the difficulty in seasoning, the opportunities for larger imports of Austrian beech are rather limited. It has been used because of its relative cheapness and hardness, but American red gum has been displacing it for many purposes. Although the domestic supply of beech has been largely wiped out during the war, it is likely that American woods will be imported to take its place, especially in the Sicilian box trade, rather than that large imports from Austria are to be expected.

BALTIC LUMBER.

The only wood that goes to Italy from the Baltic region is the redwood, or Baltic pine (*Pinus sylvestris*), from Sweden and to a limited extent from Finland; it is locally known as "pino de Muscovia." Very limited quantities, as shown in the statistics, go to Italy. It is used for the better classes of interior woodwork, particularly doors, door framing, window sash and framing, blinds, and general woodwork. It generally commands about 10 lire per cubic meter above the Austrian spruce. It is distinctively knotty, but its knots are not hard and are seldom brittle. It is particularly desired for its fine, even grain and texture and its workability. Carpenters and artisans like to work with this wood. Before the war Baltic pine usually brought 70 to 80 lire per cubic meter ($32 to $36 per 1,000 feet) and it was regarded as superior to the native pine. The latter is of the same botanical species, but owing to different conditions of growth it yields a quite different kind of lumber.

MISCELLANEOUS FOREIGN WOODS.

Maritime pine from France was brought to Italy prior to the war for use in wood-block paving and various forms of lumber used in general construction work. Its wood is very similar to that of North Carolina pine. It is not likely to return to the Italian markets because a good share of the forests in the Landes region of southwestern France, which was the producing center of this wood, has been severely cut out during the war for general emergency purposes.

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Prior to the war more or less spruce was imported from Switzerland and was used in the same way as the Austrian and the native spruce and silver fir. Probably lumber will not be imported from Switzerland after the war because Switzerland is normally much more important as an importer of lumber than as an exporter, and its forest resources have been severely drained during the war to supply the requirements in both Italy and France. The statistics on page 183 show the large quantities of wood that were imported from Switzerland into Italy during the war.

Japanese oak began to reach the Italian markets just as the war broke out in 1914. It was sold by a German lumber importer at Hamburg, and it is believed that its price was sacrificed purposely in order to introduce it into the Italian market. The total amount that has been brought to Italy is almost negligible, and it was used only for interior ship trimming and for car-construction purposes. It came in the form of large, hewn logs. Impartial observers have indicated that its wood was of very good quality, being workable, uniform in color, grain, and texture, and comparatively free from the ordinary defects.

Some spruce and fir are reported in the statistics as coming from Russia and Roumania. It is believed, however, that although this lumber is shipped from Russian ports, such as Odessa, and Roumanian ports, such as Galatz, Braila, and Constantza, the origin of at least a good share of this material is Austria. It is generally of the same quality and size as that coming from Austria either by rail or by sea and is used for the same general purposes.

Some white oak has been imported from southern Russia in the Black Sea region, but it has not met with much success for the reason that it is poorly and inaccurately manufactured, rather defective, and not so workable as the American or Austrian oak. Owing to the economic disruption of Russia, it is not likely that the forests of the Ukraine will constitute an important factor in the Italian lumber markets for the next decade at least. Furthermore, the bulk of the best Russian lumber and that portion entering most prominently into the export lumber trade lies in the northern and northwestern parts of the country, and the outlets for these forests are Petrograd, Riga, and other ports on the Baltic, and Archangel, on the White Sea.

PRINCIPAL WOOD-USING INDUSTRIES.

The wood-using industries in Italy, owing largely to the fact that wood as a material of construction is not so important as in the United States, have not developed very broadly. There are no associations or organizations designed to promote the best interests of the wood-using industries, as is commonly the case in the United States, and there have been no statistics of consumption in the various industries nor of lumber production, such as one finds commonly published by governmental, State, and educational agencies and institutions throughout the United States.

The lumber-manufacturing industries in Italy are largely characterized by the use of rather primitive methods, the operation of small shops and factories, and the employment of considerable manual labor. There are, of course, exceptions to this general rule, but there is an utter absence of large planing mills, woodworking establish-

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FIG. 20.—BOXES USED IN TRANSPORTING SHELLS AND SHRAPNEL TO THE FRONT; MADE OF NATIVE POPLAR, SILVER FIR, AND PINE.

FIG. 21.—WOODEN SHELL CASES OF ITALIAN PINE, SILVER FIR, SPRUCE, AND POPLAR.

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FIG. 22.—POPLAR BOXES USED FOR SHIPPING MUNITIONS AT A ROME WOODWORKING SHOP.

FIG. 23.—FACTORY NEAR ROME MAKING POPLAR AND PINE MUNITION BOXES.

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ments, box factories, etc., such as one finds throughout the East, South, and Middle West and the Pacific coast in the United States.

The consumption of lumber and forest products generally has increased greatly, however, with the development of industry and commerce in Italy, and there is no question that this field will develop still further. Although a program of broader wood utilization immediately after peace terms have been settled is unlikely on account of the urgency of the need of lumber for Italy's immediate reconstruction problems, it is probable that when economic conditions have adjusted themselves, after a period of three to six years, the development of the Italian wood-using industries will continue along more definite and standard lines.

GENERAL CONSTRUCTION.

For the purposes of general construction all wood products are customarily divided in Italy into four large categories. These categories are not only followed by the arrangement of customs duties, compilation of import statistics, etc., but by architects, builders, and users of lumber in general. These four categories of mechanical utilization may be described as follows:

(1) Rough construction lumber, consisting largely of logs in the round, rough-hewn timbers, round poles, and wood in the rough for general construction purposes. It represents, roughly, 10 to 15 per cent of the total imports and nearly half of the domestic production.

(2) Sawed timbers, planks, deals, and boards for furniture, framing, doors, flooring, interior trim, boxes and crating, car construction, shipbuilding, and general woodwork. This division forms the bulk of imported supplies and nearly half of the domestic production.

(3) Split wood for vehicle stock, staves and other cooperage stock, musical instruments, and a variety of other special purposes.

(4) Woods suitable for carving, stucco work, framing, high-grade cabinet and furniture work, and a few other miscellaneous purposes.

The last two categories, it is at once seen, are of minor importance, so far as the export lumber trade from the United States is concerned.

In addition, there is sometimes distinguished a fifth category of chemical utilization, in which are included such products as wood pulp and pulp wood to be manufactured into paper, wood for distillation purposes, firewood, and wood for charcoal. This category, although of considerable importance in the domestic Italian trade, is of no consequence so far as the future lumber trade with the United States is concerned.

In the first category listed (logs and timbers in the rough for general construction purposes) there are usually three subclasses distinguished: Timbers for house, for road and railway, and for naval and mining construction. For house construction, beams, rafters, scantlings, etc., are made of various sizes to suit the particular purposes. Many of these are in the round form, and a great variety of miscellaneous woods are used, but principally Austrian spruce, American yellow pine, and Italian spruce and fir. Some Italian pine, chestnut, and oak are used for these purposes, and occasionally some poplar. In the Alps of northern Italy larch enters into common house construction for beams, rafters, and small-dimension stock. There are

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usually five kinds of beams, distinguished by size, the Italian names of which are as follows: Travi, piane, correnti, regoli, listelli. The sizes of these various beams are as follows: The "travi" are 18 by 18 centimeters up to 24 by 24 centimeters in cross section and are usually 4 meters in length, but for special purposes they may be 4½, 5, 5½, or 6 meters in length. The various sizes are usually 18 by 18, 18 by 20, 20 by 20, 20 by 22, 22 by 22, 20 by 24, 22 by 24, and 24 by 24 centimeters.

The smaller beams, "piane," are generally 12 by 12 up to 14 by 16 centimeters in size; the third, or "correnti," 8 by 8 up to 12 by 12 centimeters, with a great variety of intermediate sizes between these extremes. The fourth, called "regoli," are the smaller beams from 40 by 50 up to 60 by 60 millimeters, while the very smallest, "listelli," are those from 12 by 20 millimeters up to 20 by 50 millimeters.

There are generally two qualities of beams recognized in each of the above classes. The first quality is fully square, straight, well trimmed with no waney edges, and generally free from the ordinary defects. The second quality is the rough-hewn, more or less tapered, with waney edges on two or even more corners, and with more or less knots and defects. Occasionally three qualities are recognized, in which case there is an intermediate class between the two just described. There are no definite hard and fast grading rules governing these qualities of beams, however, and this frequently gives rise to considerable confusion and argument. In many cases one end of these beams will be square, whereas the other end will be entirely round, and in the humblest forms of dwellings the roughest forms of beams and scantlings are admitted. There is a sharp distinction in price when three qualities are recognized. On the retail markets the prices would commonly be 80 lire per cubic meter ($44 per 1,000 board feet, at the normal rate of 19.3 cents for the lira, and at 353 board feet to the cubic meter for squared timber) for the first quality, 60 lire for the second ($33 per 1,000 feet) and 40 lire ($22 per 1,000 feet) for the third.

The larger beams, i. e. those in the first three classes, compose by far the greater amount of lumber consumption for this purpose, a total of 250,000 to 300,000 metric tons (153,000,000 to 183,600,000 board feet at 612 board feet to the metric ton of squared softwood timber) of this material being consumed annually under normal conditions. Of this total amount about one-third was imported and two-thirds produced locally. For the smaller beams composing the last two sizes, it is estimated by competent authorities that there was an annual consumption of about 200,000 metric tons (122,400,000 board feet) prior to the war. The proportion of this material produced locally is just the reverse of that in the case of the larger beams; in other words, only about one-third is produced locally, whereas two-thirds have annually been imported. In the future this whole situation is sure to be reversed; instead of a local production of two-thirds in the first case and of one-third in the latter case, nearly all this material must be imported after the war, since the native forests have been practically exhausted as a source of supply for it.

The second of the four main categories listed represents the sawed lumber and includes the heaviest imports of any class. Approximately 1,000,000 metric tons of sawed lumber of various kinds was

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imported annually prior to the war. The consumption, on the other hand, is about 1,300,000 metric tons.

This class of material furnished the bulk of the lumber for miscellaneous purposes for which lumber is used, aside from beams, scantlings, rafters, etc., used in general construction. It includes the lumber used for doors, sash, blinds, window frames, fixtures, ordinary furniture (particularly school, office, and kitchen furniture), flooring, interior woodwork and trim, boxes and crating material, lumber for railway, freight, and passenger coaches, interior ship-finishing lumber, and a great variety of miscellaneous purposes, such as wagon and motor-truck bodies, trunks, and certain classes of implement and machinery stock.

Although the material is imported usually in large sizes, it is eventually worked down to the following sizes for ultimate utilization. Most of this material is 4 meters (13.1 feet) in length, the favorite length not only for imported lumber from Austria but for domestic lumber. Very little is cut over 4 meters, but occasionally boards are cut 4½, 5, 5½, 6, and so on up to an extreme of about 8 to 10 meters. For longer boards, from about 14 up to 40 to 60 feet and above, southern yellow pine has been depended upon almost entirely. These large-size timbers are utilized for car construction, shipbuilding, mine timbers, factory construction, bridge building, house construction, etc.

The principal sizes in cross section of the domestic material and that worked up to sizes adapted for the uses mentioned are the following:

Thickness.		Minimum width.	
Millimeters.	*Inches.*	*Centimeters.*	*Inches.*
11	0.433	8	3.150
15	.591	13	5.118
20	.787	16	6.299
25	.984	21	8.268
30	1.181	21	8.268
35	1.378	26	10.236
40	1.575	26	10.236
50	1.969	28	11.024
80	3.150	28	11.024

More or less latitude is allowed within the dimensions given in the table.

There is a very crude sort of grading or separation into qualities for this material, whether produced from native forests or worked up to these sizes after importation from foreign countries. There are no printed or generally accepted grading rules in respect to this classification by sizes and quality, and consequently there are no hard and fast groups into which this lumber can be separated. Generally speaking, there are three qualities, referred to as firsts, seconds, and thirds. The first quality is of the very best kind of product; it must be well manufactured, straight, without prominent knots or defects, and with very few small live knots. It must contain no rotten spots nor defective wood nor any wane. The second quality tolerates some loose or rotten knots and wane on two corners up to one-third of the length, and is generally medium-quality material. The third quality tolerates almost anything in the way of defects or defective manufacture. Sometimes this lumber will be square-edged on one end and

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waney running down to almost a slab on the other end. The users of lumber generally are much more particular about imported lumber than they are about domestic lumber, for the native forests are made of up such small trees, generally speaking, that the consumers can not afford to be overparticular about the kind and quality of lumber produced from these forests.

WOODWORKING AND CARPENTRY WORK.

As has been stated earlier in this report, the woodworking industries generally are distinguished by rather primitive methods and a great amount of manual labor. Nearly every kind of wood used in Italy is employed for general woodworking and carpentry purposes. There are a great number of small carpenter shops located throughout the larger communities. Often a builder or master carpenter will have a little one or two room basement shop in which the special woodwork for a new structure is made.

The raw material is generally procured in the form of logs, flitches, timbers, planks, and deals. Very little 1-inch and 2-inch lumber goes directly to these shops for working into their ultimate forms. The Italian woodworkers are strongly inclined to obtain much larger sizes than are ultimately required and work them up to suit their local purposes, cutting out the knots and defects and utilizing the clear stock to the best advantage. The knots are not considered so disadvantageous as they are in the United States. As long as they will remain tight, they can be covered with paint and from the Italian point of view such lumber serves the purpose almost as well as perfectly clear lumber.

The shops generally have one or more pony bandsaws of Swiss, German, or French manufacture. Since the war, however, owing to the elimination of these sources of supply, the United States has sent to Italy a large number of these pony bandsaws, as well as many other forms of woodworking machinery. There are also planers, cut-off saws, etc., but not nearly the amount of machinery that one finds in American woodworking plants. Much more of the final finishing of each product is done by hand than in this country, and even in cases where a machine might do the work just as well, the Italians prefer to use hand labor. In the future this situation is likely to be reversed, however, on account of the prohibitive cost of labor in Italy for a period of at least several years after the war. This condition may permit American manufacturers to produce and ship more finished or partly finished forms of lumber for use on the Italian markets, whereas heretofore practically nothing but rough sawed lumber has been shipped to Italy.

The principal forms of wood products from the small shops and mills are doors, sash, blinds, store and office fixtures, partition work, paneling, interior finish and trim, baseboards, balustrades, cornice work, columns, posts, railings, stair work, mantels, newel work, screens, etc. It must not be deduced from this variety of product, which is similar to the products of American woodworking plants, that Italy uses these materials as much as the United States. As was noted earlier in the report, woodwork enters into general use neither for interior purposes nor for exterior purposes so much as in this country, but in the medium and better class structures more or less

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wood naturally comes into use. There are few baseboards of wood, the purpose being served by the use of plaster or cement work. Stairways are usually of marble, stone, concrete, or brick, and one finds much less frequent use of wooden mantels, newel work, wood railings, cornice work, etc., than in the United States.

There are no standard forms and sizes of doors in Italy. It is often said that in building a new structure a hole is left in the wall, and then a door is built to "fit the particular hole," while quite the reverse is true in this country. In the United States, although there are many different designs and sizes of doors, there are at least certain recognized forms, so that in house construction ready-made doors are utilized for this purpose instead of a special door made for each opening. In Italy almost every door is different from the others, and practically all are made by hand. Almost all the cheap interior doors are made of Austrian spruce, but some local silver fir and spruce and native pine are used for this purpose. Very little Baltic pine is used for doors in Italy. The better class of doors and all the exterior doors are usually made of American yellow pine. Some are made of larch, which, owing to heavy cutting, has almost entirely disappeared from the native forests of Italy, so that it will not be a factor in the future. For a few of the highest-quality exterior doors, particularly for use in palaces, country villas, public buildings, and institutions, Italian walnut, mahogany, and Slavonian oak are used. Some of these doors are made in the most attractive carved designs, but the amount of lumber used for these fancy doors is comparatively small. Most of the larger buildings in the cities have large southern-pine doors 10 to 25 feet or more in total height. These require considerable lumber, as they are heavily framed and usually heavily paneled. The smaller timbers (6 by 6, 8 by 8, 8 by 10 inches, etc.) are used in the manufacture of these heavy exterior doors, which are a common sight throughout Italy. None of these large doors seems to be made upon any given or special design, the architect in each case apparently designing a door to fit in with the general scheme of the building.

Sash, blinds, shutters, and framing are made of almost every kind of wood. Some of the best frames are made of Baltic pine from Sweden; in fact, this is almost the only use for this wood, which is imported in very limited quantities. Baltic pine is held in high esteem because of its soft, even, workable grain, and Italian carpenters are well disposed toward it. However, its comparatively high price has militated against its further introduction into Italy, and it is so similar in quality to Austrian spruce that it can not compete on a large scale with the latter wood. Probably most of these articles are made of Austrian spruce, local pine, and silver fir. Practically all the Italian windows are of the so-called French type, and they require a great deal more wood in their construction, together with the blinds and shutters, than the windows common in the United States. These so-called French windows are of the swing-door type, opening inward. Most of these French window doors are 7 to 12 feet or more in height and always extend from the floor of the room almost to the ceiling. Although the window frame itself is seldom made of American woods, American yellow pine has been used for both the shutters and the outside blinds. It is likely that a market could easily be developed for a number of American woods for sash, blinds, shutters, and framing in Italy.

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Store and office fixtures present one of the most important uses for woods in Italy and offer a distinct opportunity for the further introduction of American woods in the future, in view of the depletion of the native Italian supply and the limited variety of woods imported from other countries. In the past these fixtures have been of many different grades. In the best-class offices and stores, the fixtures are of Italian walnut, Slavonian oak, mahogany, and red gum. Most of the fixtures, however, have been made of local, Slavonian, and American white oak, American yellow pine, and American red gum. Occasionally the cheaper classes of fixtures and interior trim are made of Austrian spruce, but they are quite the exception, since this wood is so soft and weak and so knotty that it is not at all satisfactory for these purposes.

CAR CONSTRUCTION.

Italy is one of the most important European nations in the car-construction industry. It manufactures large numbers annually of passenger, sleeping, restaurant, freight, baggage, express, and street cars. Not only are its domestic needs served by its car-building factories, but in the past many railway cars have been built and exported to France and other European countries. Several decades ago Italy imported large quantities of trolley cars from factories in Belgium, Germany, and England, and France and Germany sent many passenger and freight cars to Italy. However, this former situation has been reversed and now Italy supplies not only its own requirements but in part, the needs of other countries as well.

There were 36 car-construction establishments in Italy prior to the war. The industry centers largely in and about Milan, but there are also important factories in and about Naples, Genoa, Florence, Turin, and other cities.

This industry has been one of the principal consumers of American lumber in the past, especially southern yellow pine, and after the war it will demand large quantities of lumber, since few cars have been built for a period of about four years, and the unusually heavy demands for transportation placed upon the Italian State railways during the war have caused a serious deterioration in rolling stock and equipment, which will require very large replacements. It is estimated that an almost complete new equipment will be required. Car-construction factories during the war have produced few cars, because of the lack of raw materials, such as lumber, steel, and iron, and because of the high cost and the scarcity of labor.

There are no official figures available of the total annual consumption of lumber for car-construction purposes, but it is likely to have been 60,000,000 to 100,000,000 feet annually before the war. After the war the annual demand for the construction of freight, passenger, trolley, and other cars will probably amount to 120,000,000 to 200,000,000 feet.

Although the railways of Italy are almost entirely owned and operated by the Government, the Government builds no cars. Contracts are made with private companies for the construction of the desired equipment on specifications that have been established by the officials at Rome.

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Some of the car-construction companies in Italy have an annual capacity of about 2,000 freight cars and 600 passenger, sleeping, baggage, and restaurant cars. Many of these companies use 10,000,000 to 12,000,000 cubic meters per year, or roughly 4,000,000 to 5,000,000 board feet. After the war all these companies will be forced to increase their capacity to meet the demands. In addition to these construction companies a number of repair shops, some of which are operated by the Government itself, will require large quantities of lumber.

The question of the relative merits of wooden versus steel coaches is not important in Italy. This has been an important subject within recent years in the United States, with particular reference to the danger of wreckage and subsequent fire, but in Italy it has apparently been a settled question for some time. The solution of this problem seems to lie in the efficient operation of the railway systems in Italy, as there are few accidents of a serious nature. The trains are operated at practically the same speed as in the United States.

The car-construction factories of Italy use more southern yellow pine than any other wood. Some factories depend upon southern pine for as much as 75 per cent of their total lumber requirements. White oak is purchased to supply as high as 20 to 25 per cent of individual plant requirements. The remaining supply, which varies from 5 to 15 or more per cent of the total lumber requirements, is made up of Italian walnut, ash and elm, Siamese and Java teak, and a little Baltic pine.

It is estimated that Italian car-construction factories will double their pre-war production after the establishment of peace. During the war Italy purchased at least 3,000 coal cars of 20 tons' capacity each. It is said that 50,000 freight cars are urgently needed at once.

A large share of the oak requirements is supplied by the so-called Slavonian oak from Austria, which is highly regarded for car-construction purposes on account of its soft, even texture, quiet, conservative grain, favorable seasoning qualities, workability, and uniformity of color, grain, and texture. Several other oaks have been tried out, however, including American white oak, Japanese white oak, white oak from the Black Sea region of Russia, and the local Italian oak. The factories are generally willing to pay the necessary price in order to obtain the best-quality material, and engineers and managers of some of these plants have indicated that they have had the best experience and the greatest satisfaction with the Slavonian oak. Only one shipment of Japanese oak was used and that was sold to a factory in Milan by a German importer at Hamburg. The Japanese oak was used for paneling, but being rather pliable, was not stiff enough; otherwise it was as workable as the Slavonian oak. It, too, has a quiet, conservative grain and the desirable uniformity of grain and color, although engineers state that the Japanese oak is somewhat more coarse-grained and somewhat more yellow than Slavonian oak.

It is regrettable that representative American oak has not been sent to some of these car-construction factories. Some of the shipments of American white oak to these factories have had more or less wormholes in them, and as the best stock is required for this purpose, the engineers could not use this defective material. There is no question that if representative American white oak were sent to these factories it would compete successfully with the Slavonian oak.

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Japanese oak before the war brought 100 to 110 lire per cubic meter ($55 to $60 per 1,000 board feet, at 353 board feet to the cubic meter), delivered in Milan in large rough-hewn and squared logs, from 12 by 14 up to 28 by 28 inches in cross section and from about 16 up to 30 feet in length. Slavonian oak brought 140 to 145 lire per cubic meter ($76 to $79 per 1,000 board feet), delivered at Milan, and 150 lire ($82 per 1,000 feet) was paid for the longest and widest material. It usually came in lengths of 3 to 12 meters, 150 millimeters in thickness, and 35 to 60 centimeters in width, with an average of about 45 centimeters.

American white oak was offered at 120 to 125 lire per cubic meter ($55 to $57 per 1,000 feet, at 424 board feet to the cubic meter). Italian white oak brought about the same price as American white oak, but 130 lire per cubic meter ($59 per 1,000 feet) was paid for the largest size delivered in Milan. The Italian white oak was usually delivered in the following sizes: 30 to 60 centimeters in width, 3 to 12 meters in length, with an average of about 6 meters, and 50 to 80 millimeters in thickness. The Russian white oak from the Black Sea districts was offered at about 10 lire per cubic meter ($5.50 per 1,000 feet) less than the Slavonian oak, but it was not considered desirable, because it was poorly sawn and very defective and did not work up to suit the local requirements.

Probably the Japanese oak was offered at a sufficiently low price to insure its sale on the Italian market and after introduction its price would be brought up to meet the level of the Slavonian oak provided it was considered wholly desirable and satisfactory. This was the opinion expressed by some of the Italian engineers and is a logical opinion in view of the long haul and consequent high freight rates from Japan to Italy. The Japanese oak was furnished in surprisingly large sizes, 14 by 14 inches up to 28 by 28 inches, and in various lengths from 16 to 30 feet, inclusive; it was all in hewn or roughly squared logs.

Much of the Slavonian oak was purchased by the whole log; that is, it was sawn by gang saws into large flitches, but these had been kept together. In some cases individual flitches ran about 4 to 6 inches thick, in varying lengths up to 10 to 12 meters. Usually they were not edged.

Some Italian ash was used for which 200 to 600 lire per cubic meter ($64 to $191 per 1,000 feet, at 13.5 cents to the lira and 424 board feet to the cubic meter) was paid during 1918. Some Baltic pine, or redwood, called in Italian "abete bianco," or "abete de muscovia," was used for the ceiling and roofing of passenger coaches. About 60 lire per cubic meter ($27 per 1,000 feet) was paid for this material delivered in Milan before the war.

Most of the southern yellow pine imported and used for car-construction purposes is imported in large timbers, a cubic average of 35 being often specified. In some cases rough-hewn timbers are used. In one of the largest car-construction factories in Italy there were large pieces 40 to 66 feet in length and 12 by 12, 10 by 10, 14 by 14, 12 by 16, 10 by 16, and 16 by 16 inches in cross section. Before the war this material cost about 60 lire per cubic meter ($33 per 1,000 feet at 353 board feet to the cubic meter) on board the cars at Genoa.

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Italian car builders like to import all the lumber and timbers used in their work in large sizes and then work them up to suit the local requirements. The very smallest sizes are in Baltic pine from Sweden, which came in 3 by 9 inch deals and 1½ by 4 inch battens, 24 feet long. Larger deals were wanted, but it was difficult to obtain them from the small-sized timber of the Baltic region.

The long-leaf timbers from the Southern States were used chiefly for long framing along the sides, top, and bottom of passenger, sleeping, and restaurant cars. They were required to be in one piece by the State-railway specifications. They are cut to 18 meters in length. Aside from these long timbers, southern yellow pine is used largely for third-class passenger cars, for car doors, and for siding and ceiling of freight cars. The flooring of box and other freight cars is of approximately 2-inch best-quality oak, laid across steel framing running lengthwise of the car. Large quantities of lumber stocks are usually maintained in all the important car factories, the timbers being kept in covered yards for three to five years before being used.

It is said that 3½ to 4 cubic meters of lumber are required for a 10-ton freight car with high sides, whereas 5 to 6 cubic meters are required for a box car with wooden underframing. During the war such cars as could be built often had wooden underframing, because it was impossible to get sufficient steel. In many cases local pine was resorted to as well for car flooring and siding, instead of oak or American long-leaf pine. The framing also was of local oak, whereas it usually is made of long-leaf pine.

Considerable quantities of American long-leaf pine also enter into the construction of second and third class coaches. The first-class coaches are built largely of teak, Italian walnut, and oak. Of the total passenger-car output of all the Italian factories, approximately 10 per cent is of first class, 18 per cent second class, and 72 per cent third class.

Coal and other types of freight cars cost 10,000 to 15,000 lire ($1,930 to $2,900) before the war, with steel underframing and steel supports on the superstructure. The cost of the same car with wooden underframing and without the steel supports was 7,000 to 10,000 lire ($1,350 to $1,930). Seven to 10 cubic meters of lumber are required for the passenger coach, depending upon its design and construction.

Before the war it is estimated that the cost of the different classes of passenger coaches was as follows: First-class passenger coach, 60,000 lire ($11,600); second-class passenger coach, 50,000 lire ($9,700); third-class passenger coach, 40,000 lire ($7,700); restaurant car, 120,000 lire ($23,200); sleeping car, 150,000 lire ($29,000). It is estimated that during 1918 the price would have increased 300 to 500 per cent above these prices, owing to the rise in the cost of labor and in materials of construction.

The specifications for oak flooring for various kinds of freight cars are as follows: Box cars—length, 2.60 meters, thickness, 43 millimeters, width, 16 to 25 centimeters; freight cars with high sides—length, 2.90 meters, thickness, 53 millimeters, width, 16 to 25 centimeters; freight cars with low sides—length, 2.90 meters, thickness, 63 millimeters, width, 16 to 52 centimeters.

Illustrations 24 to 41 are drawings issued by the Italian Government showing dimensions of lumber used for various parts of railroad cars

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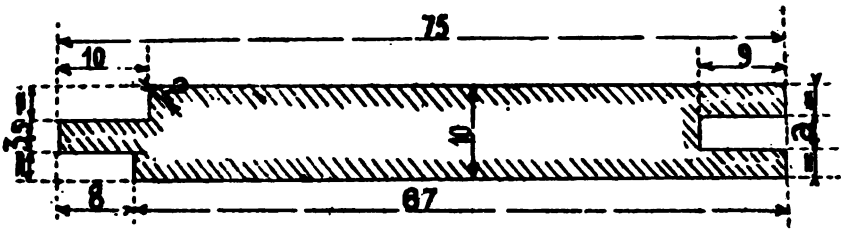

FIG. 24.—Section of lumber for ceilings and inside partitions of coaches; for subflooring of coaches and baggage cars, according to specifications of Italian Government (all measurements in millimeters). The female part a in this and following illustrations must be slightly above the corresponding male part.

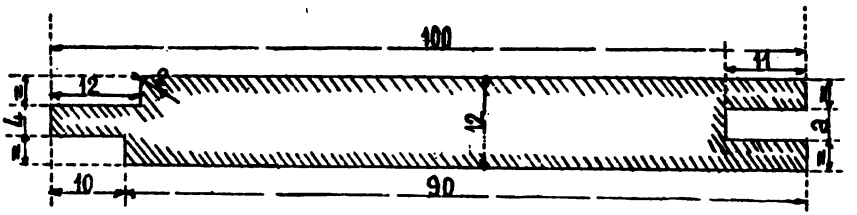

FIG. 25.—Section for inside partitions of coaches and baggage cars; for ceilings of cars having double wall thickness and partly for partitions and doors of compartment for braking apparatus.

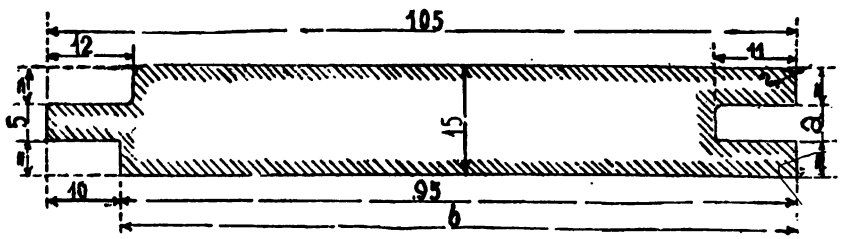

FIG. 26.—Section for roof (outside) of coaches and baggage cars, for inside partitions of baggage cars, for outside walls and sliding doors of coaches with double sheathing.

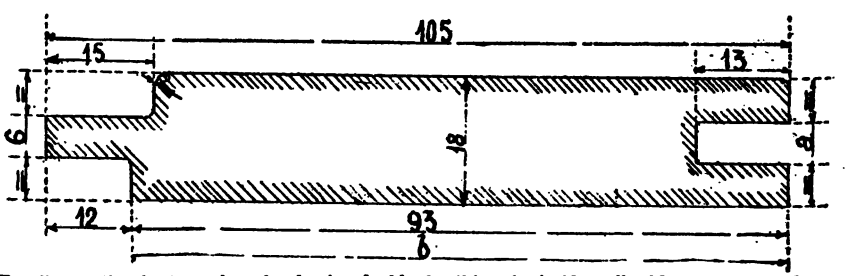

FIG. 27.—Section for tops of coaches having double sheathing, for inside walls of baggage cars and cars covered with double sheathing; also partly used for ceiling of compartment for braking apparatus.

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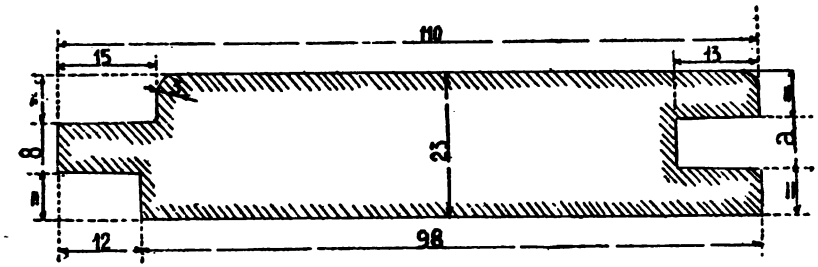

FIG. 28.—Section for inside walls of baggage cars and cars covered with double sheathing; for walls of "G" cars having single sheathing; for doors of cars with single sheathing; also partly used for flooring of compartments for braking apparatus.

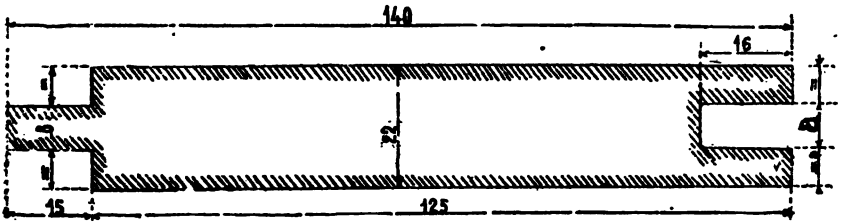

FIG. 29.—Section for flooring of coaches.

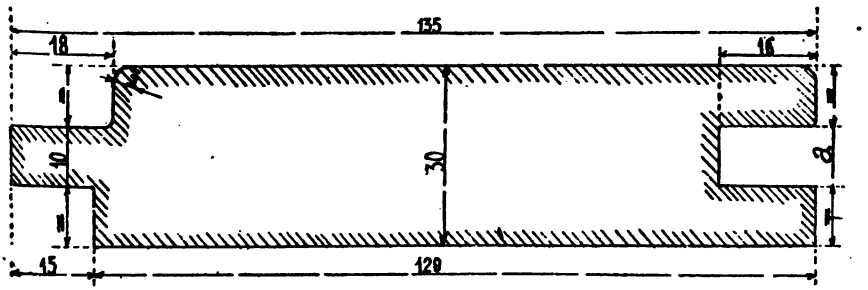

FIG. 30.—Section for walls of "G" cars with single sheathing, for hinged swinging small doors of cars "FL" with iron mountings; also partly used for walls of compartments for braking apparatus for uncovered cars.

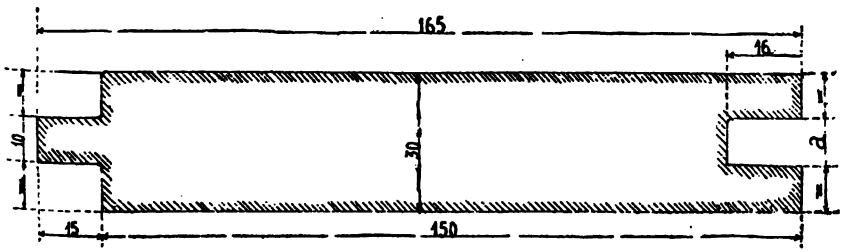

FIG. 31.—Section for flooring of baggage cars.

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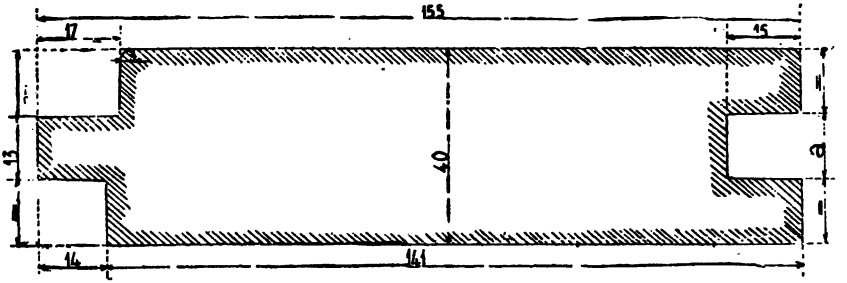

FIG. 32.—Section for drop side planking of "L" cars (for repairing "L" cars having side planking formed by planks joined by old system of connection).

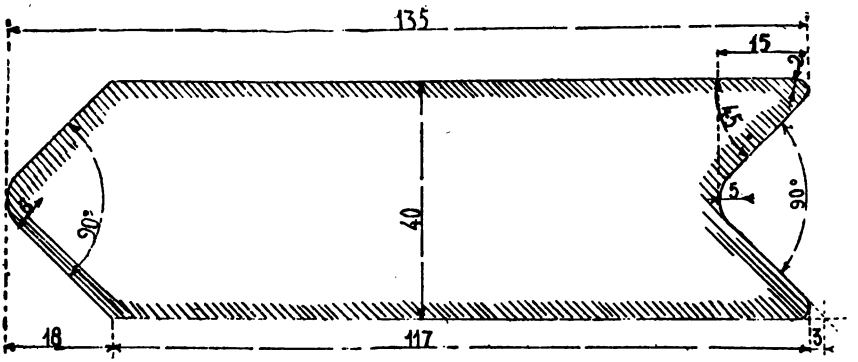

FIG. 33.—Section for drop side planking of "L" cars (for joining of standard types) and for walls of many "F-FL" cars with single sheathing.

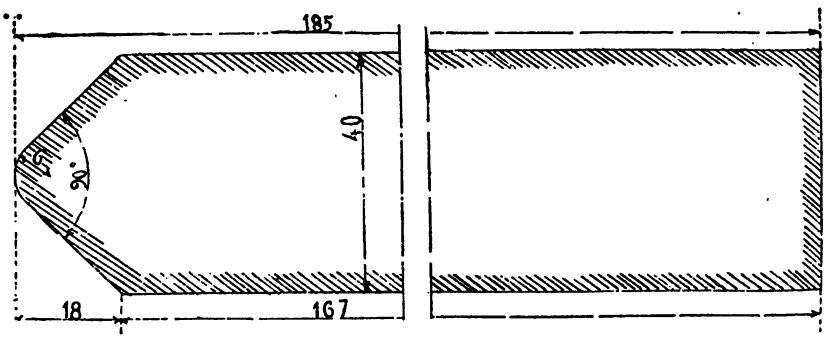

FIG. 34.—Section for drop side planking of "P" cars (standard-type joining, lower planks); used also for repairing cars "P" and "Q" having side planking lower than those of cars "P" of standard type, in which case planks will be cut as needed.

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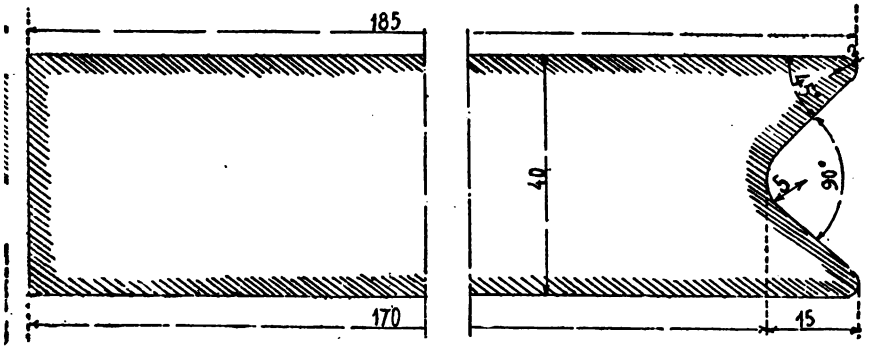

FIG. 35.—Section for drop side planking of "P" cars (standard-type joining, upper planks); also for repairs, like preceding.

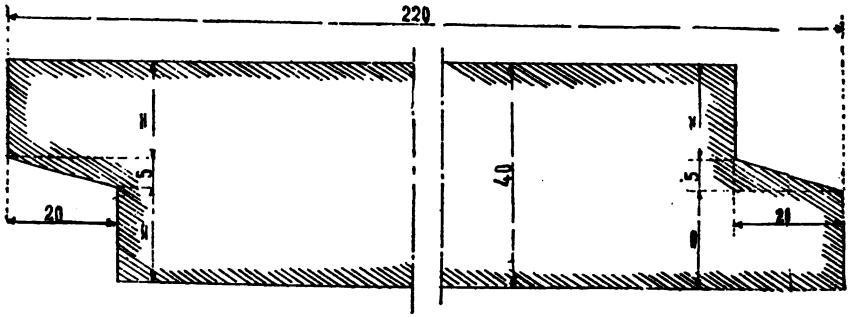

FIG. 36.—Section for flooring of cars "F-FL." Planks from 160 to 250 millimeters are also admitted.

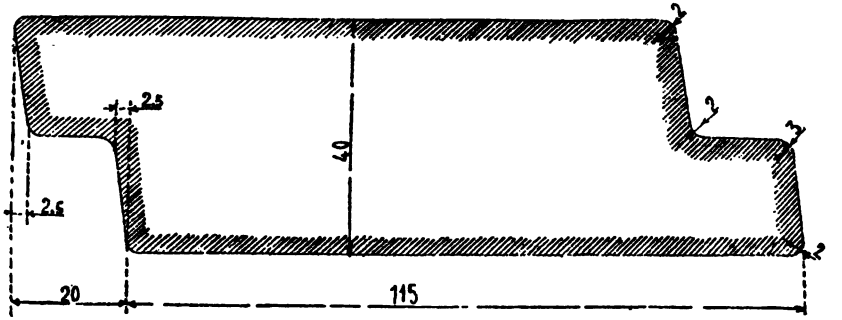

FIG. 37.—Section for walls of many cars "F-FL," single sheathing.

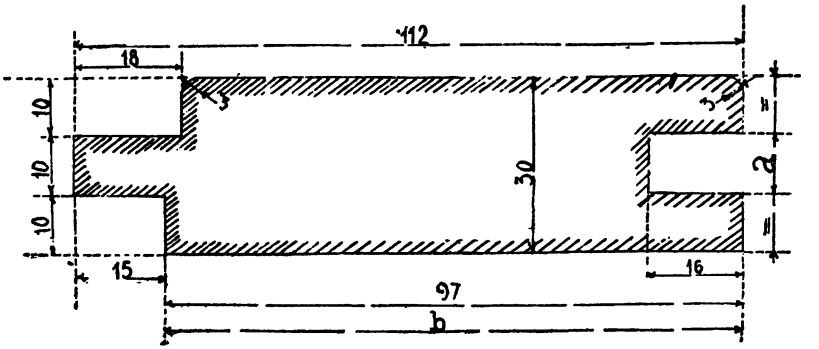

FIG. 38.—Section for roof (outside) of cars "F-FL," single sheathing.

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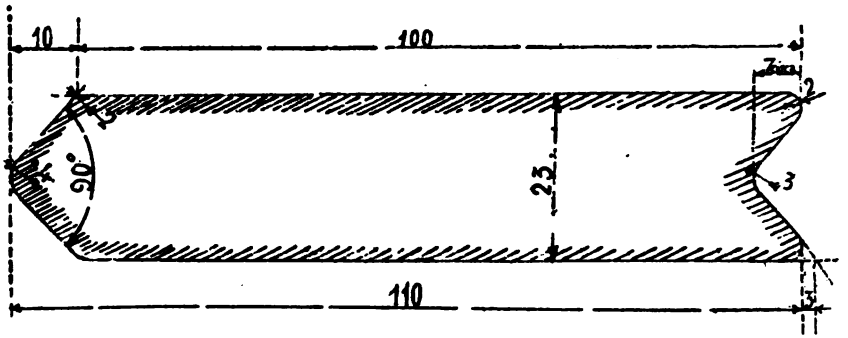

FIG. 39.—Section for sliding doors of "F" cars, single sheathing, and for lower end of front wall of compartments for braking apparatus in plain cars having single sheathing.

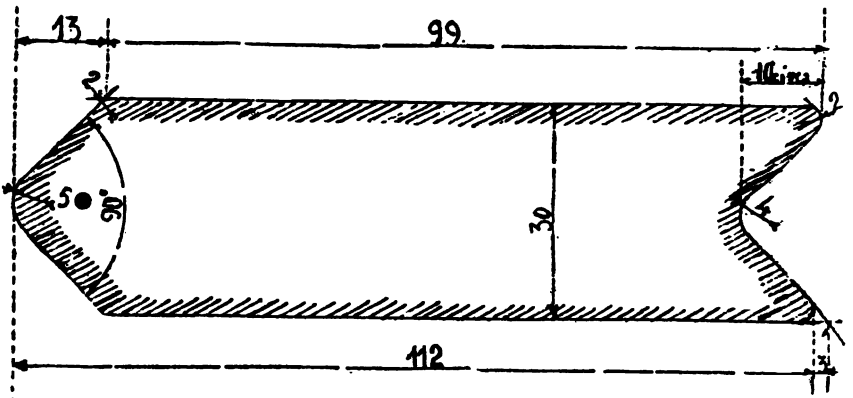

FIG. 40.—Section for upper walls of compartments for braking apparatus, single sheathing, cars "F-FL."

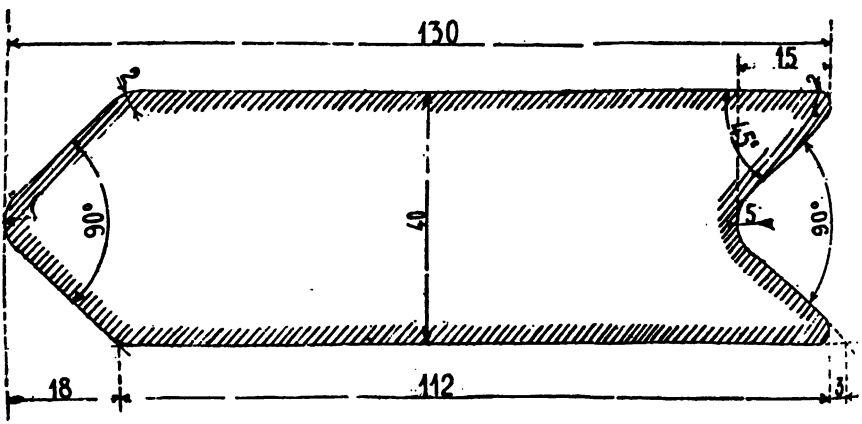

FIG. 41.—Section for walls of many cars "F-FL," single sheathing.

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SHIPBUILDING.

Italy is fully awake to the need of ships, not only for the period of the war but for the merchant shipping after the war. The country has been watching with a great deal of interest the ship-construction program in the United States. Practically half of Italy's tonnage was destroyed by the war.

Owing to its geographical location on the Mediterranean, the greatest single highway of commerce on the globe, and the fact that the country is almost completely surrounded by water, a large share of Italy's commerce, both coastwise and international, has always been carried on by water. Italian international trade grew in value from about $530,000,000 in 1863 to $1,230,000,000 in 1913. The imports alone from the United States grew from an almost negligible quantity in 1887 to over $100,000,000 in 1912.

Already large preparations are under way to engage in ship construction on a scale never before heard of in Italy. An Italian book recently published in Milan says: "The year 1917 was a culminating year for the establishment of new and powerful navigation companies, for an enormous increase in the capital of those existing, for the creation of new docks, and for the enlargement and consolidation of old." In that year (1917) 14 new companies were founded, with a total capital of $45,000,000; 9 increased their capital by $53,000,000; 9 new naval dockyards were founded, with a capital of $11,000,000; and two others increased their capital by $4,100,000. Altogether, therefore, "taken as a whole, we have the large capital of $113,000,000 put into establishments not designed to meet the pressing needs of to-day but to anticipate the requirements of to-morrow."

The great difficulty in this most promising field for the development of Italian commerce is the serious present lack of materials for ship construction, principally lumber, steel, iron, and machinery. In the rather pretentious program outlined above, many of the ships planned for construction are of steel and iron, but the smaller ones are of wood. Moreover, even in so-called steel ships, large quantities of timbers and lumber are required for framing, decking, interior finish, etc.

Before the war native timbers and lumber were largely relied upon for ship-construction purposes, the kinds being Italian white oak and to some extent the local Corsican and Ligurian pine and walnut. Southern yellow-pine timbers were in strong demand for all kinds of wooden ships, and American hardwoods, such as white oak and red gum, were used to some extent for finishing purposes. Teak also was in demand for decking, railings, and both interior and exterior finish.

After the war, however, the native sources will have been practically exhausted, owing to the extreme exigencies of the war demand, and as Austria, the great source of Italian lumber supply, has no ship timber, except Slavonian oak, suitable for finishing purposes, marine architects and shipbuilders have indicated that American lumber must be purchased to a large extent to supply this demand. The only other possible source of supply, the Baltic region, produces two woods, Baltic pine and spruce, neither of which is suitable for heavy ship-construction purposes.

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In 1913, a normal year before the war, there were 39 establishments in Italy of some consequence in the shipbuilding industry and 36,379 net tons of shipping, outside of fishing boats, small schooners, and smacks, were built. Altogether 208 ships were constructed in 1913, so that the average vessel could not have been large. Many of them were built of wood.

Genoa and Spezia and adjacent seaports are the great shipbuilding centers of Italy. Genoa is the second most important port in the Mediterranean Sea and is the greatest port of entry for lumber as well. The Naples district, including the busy shipbuilding ports of Torre del Greco and Castellamare, is very important. Other shipbuilding centers are Chioggia, Bari, Leghorn, Rimini, Venice, Ancona, and Viareggio. Nearly every little seaport or fishing village does some shipbuilding or repair work, which requires lumber of some kind.

Shipbuilders generally require the framing timbers in sizes of 11 inches and up, and the lengths from 20 feet and up. The usual method of purchase for these timbers is by the cubic average, 25 to 30 cubic feet being the most common, although 35 cubic feet average is in great demand; the larger timber the better from the shipbuilder's point of view.

Italian shipyards would now be extensively and actively engaged in ship construction if the necessary materials were available. Immediately following the war many million feet of construction lumber, hardwoods, and finishing lumber will be annually in demand in Italy for the shipbuilding industry alone.

The following table shows the number of establishments in Italy devoted to shipbuilding and the number of ships built for the years 1910 to 1914:

Years.	Number of establishments.	Number of ships.	Years.	Number of establishments.	Number of ships.
1910	35	227	1913	39	208
1911	37	202	1914	37	168
1912	35	192			

The following table shows the principal shipbuilding centers in Italy, together with the net tonnage and value of the ships completed at these centers in 1914:

Cities.	Number of ships.	Net tonnage.	Value.	Cities.	Number of ships.	Net tonnage.	Value.
			Lire.				*Lire.*
Spezia	18	10,812	6,816,200	Torre del Greco	31	2,743	891,200
Genoa	15	7,615	6,390,500	Bari	14	238	71,500
Chioggia	26	412	286,500	Leghorn	10	152	536,000
Rimini	22	487	222,870				

After the war a good portion of the larger ships built will be of steel, but even these ships require lumber for decking, framing, and interior-finishing purposes. One large shipbuilding concern was persuaded to try a Japanese oak for finishing purposes; an excellent

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sample shipment was sent to the concern and it was apparently well satisfied. It is evident that American white oak would have served the purpose fully as well. Much of the lumber required after the war will be for the building of fishing smacks and other small boats, aside from that used in the interior of steel ships.

Corsican pine (*Pinus laricio*) had been used prior to the war and at that time brought 80 lire per cubic meter ($36 per 1,000 feet at the normal exchange rate), while in 1918 it brought as high as 1,000 lire per cubic meter ($318 per 1,000 feet at 13.5 cents to the lira). The Corsican pine is generally rather knotty and close-grained and not nearly so satisfactory for this purpose as southern yellow pine or Douglas fir. Even before the war, southern yellow pine was largely depended upon to supply material for keels, sides, knees, and interior framing in the larger and better-class ships.

Along the entire Riviera coast from Genoa to the French border it was noted that many small shipyards are speeding up for the construction of schooners, fishing smacks, and other coastwise boats. These yards were noted particularly at Sestri Ponente, Sampierdarena, Savona, San Remo, and various shipping points along the Ligurian coast.

Another important factor in shipbuilding throughout Italy has been the excessive labor cost. Labor in general, for example, commanded around 30 to 40 lire per day of 10 hours, whereas the wages before the war for good skilled labor were 6 to 10 lire per day. Roughly speaking, during 1918, this has meant around $4 to $5.50 per day, instead of $1.15 to $1.90 before the war. With the lowering of the labor wage and the importation of the available materials for construction, shipbuilding will advance rapidly after the war.

The following table shows the number of shipyards in operation in Italy and the number, tonnage, and approximate value of the merchant vessels launched in 1910, 1911, 1912, 1913, and 1914:

Items.	1910	1911	1912	1913	1914
Number of merchant shipyards in operation [a]	35	37	35	39	37
Ships launched:					
Total number	227	202	192	208	168
Gross tons	28,392	24,034	30,232	59,915	45,024
Net tons	12,939	14,921	17,302	36,379	30,207
Value	$4,432,089	$2,474,054	$3,361,244	$4,091,552	$3,575,428
Ships with iron or steel hulls:					
Number	16	14	29	47	22
Gross tons	21,394	17,463	24,580	51,763	34,961
Net tons	7,863	10,522	13,251	30,496	22,390
Boats for internal service of ports and fishing boats without certificates of nationality:					
Number	1,952	1,678	1,629	1,659	1,479
Value	$549,312	$370,091	$510,415	$337,489	$237,589

[a] A roadstead or water front, even if having more than 1 establishment for the construction of ships, is considered as 1 shipyard.

The table following shows the total number, tonnage, and value of Italian merchant vessels of different kinds afloat in 1914 and the number and gross and net tonnage of those with steel or iron hulls.

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Types of vessels.	Total.					Vessels with iron or steel hulls.		
	Number.	Gross tons.	Net tons.	Value.		Number.	Gross tons.	Net tons.
				Lire.				
Ship schooners (navi golette)	12	3,121	2,756	858,000	$165,600	.....	.....	.....
Brigs	1	156	134	52,000	10,000	.....	.....	.....
Brig schooners (brigantini golette)	15	3,048	2,724	968,000	186,800	.....	.....	.....
Schooners	4	696	591	197,000	38,000	.....	.....	.....
Schooners with motors	1	75	29	35,000	6,800	.....	.....	.....
Luggers	53	1,370	955	513,370	99,080	.....	.....	.....
Luggers with motors	1	44	15	27,000	5,200	.....	.....	.....
Tartans	1	25	25	6,000	1,200	.....	.....	.....
Smacks	29	450	378	114,400	22,100	.....	.....	.....
Cutters	1	28	11	7,000	1,400	.....	.....	.....
Cutters with motors	3	82	49	48,620	9,380	.....	.....	.....
Fishing barks	5	14	.....	3,700	700	.....	.....	.....
Steamers	8	33,985	21,994	13,588,740	2,622,630	8	33,985	21,994
Excursion steamers	1	110	70	130,000	25,100	1	110	70
Tugs	29	1,340	236	1,472,700	284,200	9	386	86
Tankers	4	480	240	504,000	97,300	4	480	240
Total	168	45,024	30,207	18,525,530	3,575,500	22	34,961	22,390

BOXES AND CRATES.

The manufacture of boxes, crates, and rectangular wooden containers of all kinds is one of the most important wood-using industries in Italy. It requires a much larger percentage of the total annual consumption of lumber in Italy than the industry does in the United States, where about 10 per cent of the total lumber production of over 4,000,000,000 board feet goes into boxes and crating materials.

The industry in Italy is centered largely in Sicily, the great lemon and orange producing section, although boxes and crating materials are used for many other purposes throughout the country. Outside the packing and shipment of lemons, oranges, and other fruits, large quantities of lumber are required for the shipment of vegetables, macaroni, tomato sauce, marble products, straw hats, silk, antique wares, furniture, and various objects of art. With the exception of lemon and orange boxes used in Sicily, there is a great variation as to size. Nailed boxes are used almost entirely, the lock-cornered and dovetailed boxes and the wire-bound forms not being in use.

Probably 8,000,000 to 10,000,000 boxes of lemons alone are shipped annually in normal times from Sicily, and it is estimated that the annual production of lemons in all Italy is 11,000,000 to 14,000,000 boxes. Before the war the bulk of the export shipments of lemons were sent to the United States, Austria-Hungary, Germany, and the United Kingdom. Palermo is the largest port for the shipment of lemons in the world and is the most important center of production as well. Messina is next in importance, followed by Catania and other Sicilian ports.

American consular records show the following exports of lemons from Palermo to the United States from 1912 to 1918: 1912—3,106,500 boxes; 1913—3,351,050 boxes; 1914—2,220,299 boxes; 1915—1,501,427 boxes; 1916—1,109,565 boxes; 1917—853,126 boxes; 1918—856,987 boxes. Only about half, however, of the Italian exports of lemons goes to the United States.

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The following table shows the countries of destination of the exports of lemons from all Italy for 1913 and 1914, in tons of 2,204.6 pounds:

Countries of destination.	1913	1914	Countries of destination.	1913	1914
	Tons.	*Tons.*		*Tons.*	*Tons.*
United States	104,110	74,449	Netherlands	2,403	8,393
Austria-Hungary	45,830	30,604	Other	29,630	26,383
Germany	42,072	18,135			
United Kingdom	41,498	44,892	Total	290,292	214,306
Russia	24,749	11,450			

There are over 500 box-manufacturing establishments in Sicily. Some operate as distinct and separate box factories, while others are operated in connection with fruit-packing establishments, the material being received in the shook form. There are over 45 box factories in the city of Palermo alone to supply the local lemon, orange, and other fruit trade. One of these concerns purchases $200,000 worth of box boards annually and turns out over 600,000 boxes each year.

The raw material for lemon and orange boxes has come mostly from Austria, with a small quantity from the United States, and a little from France and the Baltic countries. About one-fourth is supplied by the Italian forests. Austrian beech has been the great source of supply, largely because of its cheapness. The Sicilian box manufacturers claim that beech holds the nail best, and although it is not at all workable or light in weight, very thin forms of this wood are used for the purpose. Some Austrian spruce and local Italian pine, as well as American red gum, beech, and birch have been used.

The following percentages represent the average for several years prior to the war of the proportion of box material supplied to Sicily by different countries: Italy, 28 per cent; United States, 7 per cent; Austria-Hungary, 60 per cent; other countries, 5 per cent. The value of the annual imports into Italy of box-board materials alone is $1,000,000.

All the lemon and orange boxes are two-compartment boxes, nailed and bound with heavy broad strips of chestnut brought from Sicily and Calabria. The outside dimensions of the standard lemon box are as follows: Length—70 centimeters (1 centimeter=0.3937 inch); width—35 centimeters; height—27 centimeters. About 70 to 80 per cent of all of the lemon boxes are of this size. Other forms are 67 by 35 by 25 centimeters. A small percentage of the boxes for the special orange trade for the English market are 80 centimeters long, 40 centimeters wide, and 30 centimeters high. Other orange boxes conform to the sizes used for lemons. The two ends and single partition, or center board, are approximately three-fourths of an inch in thickness. Some factories make the ends 1½ centimeters in thickness, and the partition 1¼ centimeters in thickness. The thickness of the top, sides, and bottom of these boxes is 3 millimeters (1 millimeter=0.03937 inch). The heads or ends are generally of one piece while the center piece is of two parts. The sides are preferably in one piece, while the tops and the bottoms are in two or more pieces.

There are generally 300 lemons per box, whereas with smaller-size fruit there are 360, 420, or 504 lemons to the box. Either 300 or 160

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oranges of different sizes go into the standard lemon box. There is also a box for 200 oranges, which is 68 centimeters long, 33.5 centimeters wide, and 25 centimeters high. The thickness of the boards is the same as for the lemon boxes.

Years ago the entire box was made of Italian or Austrian beech, the sides, tops, and bottoms being made of boards and veneered stock. In recent years, however, Austrian spruce and local pine have been used for the ends and partitions of these boxes, and American woods have successfully entered the box trade. Although the customs of the box makers are generally rather deep-rooted, it is likely that the Sicilian box trade offers a definite opportunity for the education of these firms to use American woods, which should serve the purposes much better than the Austrian product.

During the war, owing to the main sources of supply having been cut off, there has been a serious shortage of box-board materials. The box factories have been compelled to resort to all kinds and forms of lumber to make up this shortage, and prices have risen accordingly. During 1916, 1917, and 1918 factories were using Italian pine, Calabrian beech from south Italy, Swiss spruce, and Tuscan silver fir for ends and partitions, while for the tops and bottoms, every conceivable form of wood was used, including oak, ash, beech, chestnut, mulberry, sycamore, and alder. Large chunks and butts, and even large limbs, were sawed up to make boxes.

Before the war, the largest and most important box manufacturers imported their raw materials direct from Austria or the United States, while the smaller concerns bought through local agents.

The best lumber comes from Austria in shooks or in boards, usually 4 meters long, 4 to 5 millimeters thick, and 18 centimeters wide. These are used for ends and partitions and are cut up by pony band-saws in 3 sheets for sides and bottoms. One manufacturer estimates that he can turn out 200 standard lemon boxes from 1 cubic meter of lumber without the ends or partitions. One cubic foot of lumber will make about 360 heads. The top is of different size from the bottom. Owing to the fact that the fruit contents bulge out when packed, a wood that is flexible and will bend is required. Consequently for the standard lemon box, which is 70 centimeters long in outside dimension, the top is usually 73 centimeters long and 38 centimeters wide to provide for the extra bulge. During the voyage to destination by land or sea, the boxes, which start out greatly bulged, settle down, so that the tops are flat on reaching destination. Freshly sawn, green lumber, consequently, is generally desired, and it is often cut by veneer machines in Trieste, Fiume, and other ports.

Sometimes the raw material comes to Sicily in packages, 40 tops or covers in a package. Single boards 2.5 or 2.6 meters in length, 18 to 20 centimeters in width, and 18 millimeters in thickness, cost 0.60 lira for the best before the war, whereas in 1918 they were bringing 2.17 lire. These were of beech. Other forms of imports were boards 4 meters in length, 18, 20, 24, and up to 40 millimeters in thickness, and 16 to 40 centimeters in width. Importers bid about 75 lire per cubic meter for this Austrian beech, stock delivered in Sicilian ports. The wooden strips or cleats were generally 1.3 to 1.4 meters in length and ¾ to 1 inch in width. They brought 1.9 to 2 lira ($0.37 to $0.39) for 180 strips before the war, whereas in 1918 they brought 8 to 10 lire ($1.08 to $1.35).

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Before the war, box manufacturers received 0.75 to 0.90 lira 14 to 17 cents) per box for the standard lemon-box size, in knockdown fashion, whereas in 1918 the prices fluctuated between 3 and 3.5 lire (41 and 47 cents at 13.5 cents to the lira), depending upon the kind of wood used, workmanship, etc. There was a great scarcity of available wood. For the box set up but without the top nailed on, about 20 cents each was paid before the war.

Aside from the boards, box material from Austria came in bundles of 40 pieces. These cost 2.70 lire (52 cents) per bundle in Fiume and Trieste before the war. The freight to Catania was about 0.20 lira (4 cents) per bundle, which was made up of 60 per cent of sides and 40 per cent of tops and bottoms. The ends or heads and partitions were almost always made from boards. Sometimes the covers or tops were imported separately, as many manufacturers preferred that they be produced from green stock and be shipped immediately, so that they would bend better and yield to expansion over the contents of the boxes. One manufacturer of boxes bought boards and bundles of shooks of Austrian beech; then he worked these materials into the finished shooks, and assembled the tops, bottoms, sides, ends, and partitions in bundles sufficient to make two boxes, or, in other words, two complete sets of parts. These are sent to the factories in the country in knockdown form, ready to set up.

All boxes are of the nailed form, 50 nails being used per box, including 26 nails through the cleats. Nails are about 1 inch long and are of Italian manufacture. Steel strips and cleats for strengthening purposes are never employed. The boxes are always stenciled on the end with the packer's name, place, character of contents, etc.

Rough-finished shooks or lumber intended for boxes pay no duty in coming to Italy, and lemon boxes and lemons imported into the United States from Italy pay no duty for the boxes, provided that the lumber used for the manufacture of the boxes was exported from this country for the purpose. This is a very important consideration in introducing American goods to be used for boxes in Italy. The prices of lemon boxes—that is, including both the fruit and the box itself—vary considerably both in the season and from year to year. Before the war, first-quality standard lemons brought 6 to 7 lire ($1.16 to $1.35 at the normal exchange rate), whereas second-quality products brought 5 to 6 lire ($0.97 to $1.16) per box. During 1918, best-quality products brought 14 to 16 lire ($1.89 to $2.16 at $0.135 to the lira) and second quality, 11 to 14 lire ($1.49 to $1.89). However, not only wood, but labor and even wrapping paper have increased greatly at present. Packing girls before the war received 0.75 to 1.50 lire ($0.14 to $0.29) per day of 10 hours, whereas in 1918 they received 1.75 to 2 lire ($0.24 to $0.27 at $0.135 to the lira) per day. Wrapping paper increased from 0.65 lira ($0.13) for 500 sheets before the war up to 5.50 lire ($0.74) in 1918.

There has always been a great fluctuation in the market price of lemons in the export trade, large shipments of 60,000 or more boxes always resulting in flooding the markets and depressing prices. Usually shipments are made in parcel lots of 20,000 to 30,000 boxes each. Shipments to New York take 15 to 16 days by steamer. It was said that the best prices were obtained in summer, but the greatest volume of business was done in winter. Shipments are made the year round. For shipping purposes, it is said that 24

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boxes of lemons, including the heads of the boxes, are equivalent to a metric ton of 2,204.6 pounds. Although the prices mentioned are excessively high, it is not likely that they will drop to pre-war levels very rapidly. The demand for lumber and shooks for the manufacture of boxes will be very large following the war, as there is a great deficiency to be met. Stocks are depleted, and the native supply, which formerly furnished 25 per cent of the total consumption, has been exhausted.

Sicilian box makers state that a pitchy pine or one containing any considerable amount of resin is undesirable because of the tendency to exude resin in the hot, dry climate of Sicily. This resinous condition imparts an unpleasant odor to the citrus fruits and an unattractive appearance to the box when it arrives at its destination.

In other parts of Italy there are large box factories, particularly in Rome, Florence, Turin, Milan, and Genoa. During the war all these factories, as well as many furniture factories, were engaged in the manufacture of munition boxes, and boxes and crates for the shipment of food, shells, and other war supplies. Large quantities of lumber were required for these purposes, and with the Austrian spruce (the principal source of supply) cut off, all kinds of miscellaneous local lumber were called in to meet the urgent demand.

The following table shows the prices paid before the war and during 1918 for box boards and materials of different species. Conversions have been made at the rate of 424 board feet to the cubic meter and at $0.193 to the lire before the war and $0.135 in 1918.

Species.	Prices before the war.		Prices in 1918.	
	Lire per cubic meter.	*Dollars per 1,000 feet.*	*Lire per cubic meter.*	*Dollars per 1,000 feet.*
Local poplar	45	20	150–180	48–57
Local eucalyptus	(a)	----	110–135	35–43
Local elm	45	20	150–170	48–54
Austrian spruce	60–70	27–32	(b)	----
Swiss spruce	(a)	----	600–650	191–207
American yellow pine	70–90	32–41	900–1,000	287–318
Native and Austrian beech	70	32	220–250	70–80
Italian silver fir	55–65	25–30	250	80

a None used. b None available.

Many of these factories were glad to take odd logs, which were exceedingly crooked and rough, defective stumps, and miscellaneous chunks of limb wood, etc.—material that would have been considered wholly inadequate and unsatisfactory prior to the war. The local supply of box-board and crate stock has been practically exhausted, and it is believed that one of the most important fields for American lumber of the cheaper form will be for box-board and crating materials.

Box-board manufacturers seem to be very open-minded and even in a receptive attitude in regard to introducing American box lumber, and some are very anxious to introduce American softwoods for the purpose. American lumber manufacturers should take advantage of this situation to exploit the Italian market for this material. Many box manufacturers have expressed their willingness to pay a little more for the American lumber product than that of Austria, since Austrian beech is not wholly suited to the purpose and will probably be very high after the war.

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The following table shows the quantity and value of the Italian imports and exports of box boards from 1911 to 1918, the figures for 1918 being provisional:

Years.	Imports.		Exports.	
	Metric quintals (220.46 pounds).	Lire.	Metric quintals (220.46 pounds).	Lire.
1911	20,653	867,426	2,564	107,688
1912	13,696	575,232	4,017	168,714
1913	21,696	911,232	4,060	170,520
1914	29,911	1,316,084	2,556	112,464
1915	10,406	499,488	8,486	424,300
1916	20,183	605,490	5,362	294,910
1917	8,069	403,450	3,053	198,445
1918	4,612	230,600	2,664	173,160

The following table shows the quantity and value of the imports of box boards into Italy, by principal countries of origin, from 1913 to 1916, the latest year for which detailed figures of values are available:

Countries.	1913		1914		1915		1916	
	Quintals.	*Lire.*	*Quintals.*	*Lire.*	*Quintals.*	*Lire.*	*Quintals.*	*Lire.*
Austria-Hungary	19,683	826,686	25,347	1,115,268	8,224	394,752	.....	.....
France	79	3,318	31	1,364	104	4,992	81	2,430
Germany	563	23,646	967	42,548	1,166	55,968	.....	.....
Greece	180	7,560	.....	.....	.....	.....	.....	.....
Malta	230	9,660	.....	.....	.....	.....	.....	.....
Netherlands	.....	.....	.....	.....	430	20,640	.....	.....
Roumania	.....	.....	.....	.....	.....	.....	1,607	48,210
Russia	.....	.....	1,686	74,184	.....	.....	.....	.....
Sweden	803	33,726	1,850	81,400	.....	.....	.....	.....
Switzerland	102	4,284	30	1,320	479	22,992	18,495	554,850
United Kingdom	41	1,722	.....	.....	.....	.....	.....	.....
All other countries	15	630	.....	.....	3	144	.....	.....
Total	21,696	911,232	29,911	1,316,084	10,406	499,488	20,183	605,490

In 1916 and 1917 practically all the box boards imported came from Switzerland, the quantities being 18,495 quintals in 1916, 7,843 quintals in 1917, and 4,442 quintals in 1918.

The box-board market of Italy may be summarized as follows:

(1) The fruit trade of Italy will probably require 100,000,000 to 200,000,000 board feet of shooks for several years following the return to normal conditions. In addition, large amounts are required for boxes and crating materials in the important industrial and agricultural districts throughout Italy. About 20,000,000 boxes are used annually for the fruit trade of Sicily.

(2) The native forests, which formerly supplied 30 to 40 per cent of the annual requirements, have been heavily depleted during the last five years.

(3) There is a distinct opportunity to educate the makers and users of fruit boxes in Italy to the employment of American woods and the adoption of a better type of package.

(4) The wood chiefly used heretofore has been Austrian beech.

(5) Prices for box materials will probably be sufficiently high to attract American exporters. Sicilian box makers are well disposed toward American lumber.

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FLOORING.

Of the flooring of all kinds used in Italy probably more than half is of mosaic composition, marble, tile, brick, stone, etc. The humblest dwellings seldom, if ever, have wood floors, and in the smaller communities of rural districts there is no floor at all in some dwellings, the bare ground serving the purpose. There is also a distinct tendency toward the greater use of wood flooring in the north, where the winters are cold and severe, whereas in the south the cool floors of tile, marble, and stone are regarded as more suitable to the long, hot, dry summers.

The general type of structure, particularly in the case of public buildings and dwellings, is generally better in the northern Provinces of Italy than in the south, and to this fact also may be attributed the greater use of flooring.

The best structures, especially in the case of dwellings, shops, clubs, hotels, and public buildings generally, have parquetry wood floors of many attractive designs, with pitch-pine flooring in the hallways.

The principal woods used for flooring in Italy are local white oak, American pitch pine, Slavonian white oak, Italian walnut, Austrian and Italian beech, and in the case of the cheapest forms of flooring, Austrian spruce and occasionally local pine and silver fir. Nearly all the kiln-dried saps imported from the Southern States are utilized for flooring purposes, and are imported in sizes of 1 by 3, 1 by 4, and 1 by 5 inches. Probably 75 per cent of all this material is cut up and used in parquetry designs. The flat-grain flooring and rift-sawed flooring are both used.

In reply to questions on the subject, the Italian architects stated that stone, tile, and brick floors are used because they are cheaper, more sanitary, and more permanent, as well as being cooler in summer. Wooden floors are generally regarded, however, as being far more attractive and pleasing, and there is a distinct tendency throughout Italy to use more and more wood floors. They are already used in the best classes of both private and public buildings.

Italy exports considerable quantities of parquetry flooring in knocked-down fashion to South America, where it is held in high esteem. It is also exported to France, Belgium, and the United Kingdom, where it is used and sometimes exported as French parquetry flooring.

In Italy there are no standard sizes of flooring for each kind of lumber as there are in the United States. Each company decides upon and markets its own sizes in both plain flooring and parquetry designs. This lack of uniformity and standardization gives rise to more or less confusion. It is an important reason why it should be difficult to send finished flooring to Italy, irrespective of the import tariffs, unless it could be distributed through a house that specializes in flooring.

The most beautiful and artistic forms of parquetry flooring may be seen in the large public buildings, art galleries, universities, and similar institutions throughout the country. For this purpose they mix various species such as southern yellow pine and white oak; maple, cherry, and oak in combination; light and dark stained oak contrasted; beech and oak; and beech, maple, and cherry, as well

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as various other combinations. The cost of making and laying these parquetry floors is much higher than is the case with the plain flooring, and there is a definite opportunity to educate the users of wood floors in Italy not only to greater use but to cheaper forms of plain flooring. With the great rise in wages, it is likely that less parquetry flooring will be laid after the war, because an important part of the total cost of these floors is the labor cost.

There should be a growing market for American woods for flooring purposes, especially American oak, as well as Douglas fir, southern yellow pine, and hard maple and birch.

FURNITURE.

Italy is one of the most important nations in Eurpoe in the manufacture of furniture. The Italian furniture product is both well known and highly regarded in the world's furniture markets. The industry developed rapidly within the decade prior to the war; but the industry is very ancient, and Italian antique furniture, particularly of Florentine designs, is still an important commodity on the markets of Italy and demands high prices in the markets of Italy, France, and England.

The centers of furniture manufacture in Italy are Palermo, in Sicily, and Milan, Florence, and Turin. Important furniture factories are located also at Mantua, Genoa and its environs, Messina, Venice, and Naples. The industry is characterized by a great amount of manual labor. There are a few factories that would compare favorably with the largest furniture-manufacturing establishments in the United States. On the other hand, there are a great number of small shops where handmade furniture is the principal product. Labor-saving devices and specialized machinery have not been introduced in Italy to the extent to which they are used in the United States; in fact, quite the reverse is generally true.

The highest grades of furniture are made of Italian walnut, which is considered the furniture and cabinet wood "par excellence," mahogany and other tropical or semitropical woods, and Slavonian white oak. Medium-quality furniture, which constitutes probably 50 per cent of the total furniture product, and which includes the great bulk of office, dining-room, bedroom, schoolroom, and similar furniture, is made of American red gum, southern yellow pine, Italian white oak, Slavonian and American white oak, and a few other species that are of negligible interest. The lowest grades and cheapest forms of furniture, which constitute about 35 per cent of all the furniture made, are made of Austrian and local beech, especially for bentwood furniture, such as ordinary chairs, southern yellow pine, Italian chestnut, local oak, Austrian spruce, and Italian pine.

Some of the Italian furniture factories use American red gum only, while others depend entirely upon southern yellow pine. Many factories use only these two kinds of lumber. Furniture made of southern long-leaf pine is common throughout Italy. It stands out in sharp contrast to the furniture used under similar conditions in the United States, where one seldom, if ever, finds long-leaf pine used for furniture purposes. It is generally given a hard, waxed finish and presents a very attractive appearance, especially for desks, book cabinets, racks, tables, and general cabinet purposes.

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It is exceedingly difficult to state any hard-and-fast average prices paid prior to the war, since so many items enter into the cost at the factory. The following figures, however, represent the average of the prices of lumber delivered at several of the larger factories before the war and in 1918. Conversions have been made at the rate of 424 board feet to the cubic meter, except in the case of southern yellow pine and Slavonian oak, which, being largely timber or flitches, have been converted at 353 board feet to the cubic meter. The lira has been converted at $0.193 for prices before the war and $0.135 for 1918.

Species.	Prices before the war.		Prices in 1918.	
	Lire per cubic meter.	*Dollars per 1,000 feet.*	*Lire per cubic meter.*	*Dollars per 1,000 feet.*
Southern yellow pine	80– 90	44– 49	700–900	267–344
Red gum	160–200	73– 91	(a)	.....
Slavonian oak	400–500	219–273	(a)	.....
Italian pine	40– 70	18– 32	175–250	56– 80
American white oak	150–200	68– 91	(a)	.....
Italian chestnut	70– 80	32– 36	280–350	89–111

a None available.

Furniture manufacturers generally purchase from the wholesale lumber merchants or the importers at the larger ports of entry.

The furniture manufacturers prefer the larger sizes of deals, planks, flitches, or even timbers, which are then resawed and worked up to the desired shapes and sizes. Slavonian oak is usually purchased in large hewn timbers or in flitches of 3 to 6 inches in thickness and about 12 to 25 inches in width. Southern yellow pine is usually used in timber sizes and the American hardwoods in 2 to 3 inch planks.

When the supply of imported lumber was cut off shortly after the war started, the Italian furniture manufacturers resorted at first to the remaining supplies of pitch pine, red gum, and local oak, since the Austrian source of supply was eliminated in May, 1915. Then, as these woods rapidly rose in price and gradually disappeared from the markets, the furniture manufacturers were forced to use Calabrian beech from southern Italy, Swiss spruce, local chestnut, oak, and poplar, and almost any available kind of lumber. All these native varieties were distinctly deficient and inferior in quality as well as in size and in the method of sawing, seasoning, etc. During the last two years of the war, owing to the lack of lumber supplies and to governmental requisition of furniture factories and most of the lumber supplies, practically no furniture of any kind was made throughout the country. Even during the first two years of war the output dropped to an insignificant amount.

As a result of this situation, it was practically impossible to buy any new furniture in some of the larger cities. The only kind obtainable, in the experience of an American consul in one of the largest Italian cities, was secondhand and antique furniture. In other cases antique furniture, with its artificially exaggerated prices, was cheaper to purchase than new furniture.

For the last two years practically every manufacturing establishment has been devoted to the making of airplane parts, such as

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wings, propellers, and fuselages, boxes for munitions and food supplies for the Army, and other specialized products for the war program.

One of the most important fields for American lumber, particularly hardwoods, will be for furniture in Italy. Not only have furniture stocks completely disappeared from the retail and wholesale furniture stores, but the furniture plants themselves are entirely without raw material. Furthermore, the domestic sources of supply heretofore depended upon to furnish probably 50 to 70 per cent of the entire furniture lumber have been seriously depleted or almost completely exhausted.

American red gum is both widely known and highly appreciated throughout the furniture markets of the country for furniture purposes, especially for office desks and dining and bedroom furniture. Its attractive grain, color, receptivity to stains, and workability are highly regarded, and it is well known throughout the Italian furniture trade. It is universally appreciated as a high-grade furniture and cabinet wood, and no doubt its consumption in Italy will increase in the future. A large share, probably 70 to 80 per cent, of the total imports of about 9,000,000 board feet of red gum is used for furniture. Most of the Italian school furniture is made of southern yellow pine. Its grain, figure, color, and hardness are especially appreciated for this purpose, but it is also commonly used for office desks, cabinets, bookcases and racks, and various kinds of tables.

There has been no tendency toward either the manufacture or the importation of steel furniture. It is scarcely used at all in Italy, and the excessively high cost of steel and steel products will probably prevent it from being used to any large extent.

A great deal of imitation antique furniture has been made and exported from Italy. Many fancy designs of Florentine furniture are made and exported, especially from Tuscany, in central Italy. The industry is generally characterized by a great deal of handwork, in which many exquisite and beautiful designs find a ready market in France, England, and Germany. The Italian carved and inlaid furniture has developed a wide reputation in both local and foreign markets.

The exports of furniture and furniture parts from Italy from 1910 to 1913, with the principal countries of destination, were as follows:

Furniture and parts.	1910		1911		1912		1913	
Not upholstered:	*Lire.*		*Lire.*		*Lire.*		*Lire.*	
Of common bentwood	191,240	$36,910	110,880	$21,400	177,760	$34,310	263,840	$50,920
Egypt	38,780	7,480	18,080	3,490	45,600	8,800	82,720	15,960
Tripoli and Cirenaica	11,620	2,240	1,920	370	38,720	7,470	56,690	10,940
Tunis	16,100	3,110	8,960	1,730	22,560	4,350	22,720	4,380
Turkey, Asiatic	26,600	5,130	19,200	3,710	1,760	340	26,400	5,100
Of other common wood	471,100	90,920	477,120	92,080	759,840	146,650	744,800	143,750
Argentina	158,620	30,610	77,440	14,950	109,120	21,060	149,760	28,900
France	77,420	14,940	70,720	13,650	123,360	23,810	60,640	1,700
Germany	29,680	5,730	32,480	6,270	24,960	4,820	23,200	4,480
Switzerland	80,780	15,590	68,000	13,100	70,400	13,590	51,840	10,010
Tripoli and Cirenaica	840	160	8,320	1,610	168,160	32,460	260,960	50,370
Uruguay	4,340	840	44,000	8,490	77,600	14,980	35,040	6,760
Of cabinetmakers' wood	2,410,500	465,230	3,826,500	738,520	3,962,500	764,760	3,599,000	694,610
Argentina	918,000	177,170	1,746,500	337,070	1,571,000	303,200	1,528,000	294,900
Austria-Hungary	171,500	33,100	142,000	27,410	249,500	48,150	146,500	28,270
Brazil	75,500	14,570	119,500	23,060	249,000	48,060	238,000	45,930
Central America	13,000	2,510	3,500	680	17,000	3,280	21,000	4,050
Chile	94,500	18,240	190,000	36,670	139,500	26,920	156,500	30,200
Cuba	5,000	970	8,000	1,540	7,000	1,350	52,000	10,040

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Furniture and parts.	1910		1911		1912		1913	
Not upholstered—Con.								
Of cabinetmakers wood—Continued.	*Lire.*		*Lire.*		*Lire.*		*Lire.*	
Egypt	207,000	39,955	347,000	66,980	269,000	51,920	119,500	23,060
Eritrea			8,000	1,540	7,000	1,350	20,500	3,960
France	30,500	5,890	27,500	5,310	32,500	6,270	12,500	2,410
Germany	20,500	3,960	6,500	1,250	22,500	4,340	26,000	5,020
Mexico	71,000	137,030	83,000	16,020	113,000	21,810	61,000	11,770
Peru	22,500	4,340	25,000	4,830	53,000	10,230	20,000	3,860
Somaliland, Italian	11,500	2,220	42,500	8,200			46,000	8,880
Spain	20,000	3,860	4,500	870	16,500	3,180	39,000	7,530
Tripoli and Cirenaica	1,500	290	7,500	1,450	250,500	48,340	250,500	48,350
Tunis	18,500	3,570	34,500	6,660	29,500	5,690	49,000	9,460
Turkey, Asiatic			2,000	390			43,500	8,400
United Kingdom	18,500	3,570	40,000	7,720	53,500	10,330	35,500	6,850
United States	383,500	74,020	393,500	75,950	372,500	71,890	294,500	56,840
Uruguay	197,500	38,120	445,000	85,890	341,000	65,800	341,500	65,910
Veneered	237,000	45,740	185,000	35,710	193,000	37,250	124,500	24,030
Austria-Hungary	8,500	1,640	6,500	1,250	7,000	1,350	26,500	5,110
Egypt	113,500	21,910	81,500	15,730	91,500	17,660	34,500	6,660
Carved or inlaid	6,554,800	1,265,070	6,627,600	1,279,100	6,701,800	1,293,450	6,523,300	1,259,000
Argentina	998,200	192,650	540,400	104,300	655,200	126,450	716,800	138,340
Austria-Hungary	330,400	63,770	240,100	46,340	174,300	33,640	321,300	62,010
Belgium	74,200	14,320	95,200	18,370	68,600	13,240	60,900	11,750
Brazil	25,200	4,860	42,000	8,110	25,200	4,860	85,400	16,480
Chile	25,200	4,860	65,800	12,700	34,300	6,620	28,000	5,400
Denmark	10,500	2,030	15,400	2,970	11,200	2,160	22,400	4,320
Egypt	261,100	50,390	220,500	42,560	130,900	25,260	25,200	4,860
France	2,527,700	487,850	3,144,400	606,870	3,435,600	663,070	3,599,400	694,680
Germany	737,100	142,260	651,700	125,780	562,100	108,490	573,300	110,650
Mexico	214,200	41,340	44,800	8,650	34,300	6,620	37,800	7,300
Netherlands	16,100	3,110	9,100	1,760	21,000	4,050	40,600	7,840
Roumania	4,900	950	42,000	8,110	56,000	10,810	65,800	12,700
Russia	29,400	5,670	4,900	950	16,100	3,110	42,700	8,240
Serbia	700	140					53,200	10,270
Switzerland	595,000	114,840	735,700	141,990	847,000	163,470	372,400	71,870
Tripoli and Cirenaica	9,100	1,760	91,700	17,700	75,600	14,590	64,400	12,430
Turkey, European	79,800	15,400	21,000	4,050			37,800	7,300
United Kingdom	213,500	41,210	242,900	46,880	147,700	28,510	109,900	21,210
United States	129,500	24,990	145,600	28,100	180,600	34,860	67,900	13,100
Uruguay	27,300	5,270	24,500	4,730	81,900	15,810	32,900	6,350
Upholstered:								
Of common wood	251,560	48,550	199,500	38,500	185,060	35,720	167,580	32,340
France	6,460	1,250	33,060	6,380	31,540	6,090	26,600	5,130
Tripoli and Cirenaica	4,180	810			52,440	10,120	33,820	6,530
United Kingdom	30,400	5,870	21,280	4,110	31,540	6,090	51,300	9,900
Of cabinetmakers' wood	388,740	75,030	248,000	47,860	305,000	58,860	327,980	63,300
Argentina	218,860	42,240	58,900	11,370	41,540	8,020	141,360	27,280
Tripoli and Cirenaica					83,700	16,150	63,860	12,330
United Kingdom	4,960	960	3,100	600	10,540	2,030	20,460	3,950
Veneered	26,950	5,200	1,650	320	4,950	950	28,050	5,410
Carved or inlaid	449,250	86,710	175,680	33,910	223,920	43,220	259,920	50,160
Argentina	24,750	4,780	64,800	12,510	10,080	1,950	94,320	18,200
Austria-Hungary	21,000	4,050			19,440	3,750	67,680	13,060
France	120,750	23,310	5,760	1,110	54,720	10,560	24,480	4,720
Germany	168,750	32,570	23,760	4,590	14,400	2,780	24,480	4,720
Total	10,981,140	2,119,360	11,851,930	2,287,400	12,513,830	2,415,170	12,038,970	2,323,520

The following figures show the furniture imports into the United States from Italy for the five years ended June 30, 1918: 1914, $66,360; 1915, $59,439; 1916, $53,352; 1917, $111,026; 1918, $20,736.

MINE TIMBERS.

In comparison with the nations of great mineral wealth and production, Italy does not occupy a prominent position. However, in normal conditions such as prevailed prior to the war, Italy consumed over 36,000,000 board feet annually for mine timbers. There are over 1,050 mines in Italy, of which 605 are active and productive, employing over 50,000 miners. The total annual value of minerals produced in normal times was about 100,000,000 lire ($19,000,000).

The normal annual production of minerals in Italy is as follows: 2,370,000 tons of sulphur; 781,000 tons of lignite; 300,000 tons of

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iron and copper pyrites; 706,000 tons of iron; 150,000 tons of zinc; 90,000 tons of mercury; 90,000 tons of copper; 50,000 tons of lead; 200,000 tons of asphalt.

The cement industry is large and important, for it employs 100,000 workmen and there are over 12,000 kilns and furnaces.

Throughout the rugged contour of the Alps, Apennines, and Calabrian Mountains, as well as the mountains of Sicily and Sardinia, there is a great variety of metals and minerals, which in time will be developed and will require large amounts of lumber and timber for props, caps, lagging, mine ties, shafting, bridging, housing, temporary construction work, etc.

The greatest single drawback to the development of Italy's industrial potentialities and requirements is the almost entire lack of good coal. Italy annually imports 10,000,000 tons of coal, of which four-fifths comes from England and the remainder, prior to the war, from Germany. Whereas in 1914 coal brought 30 to 35 lire ($5.80 to $6.75) per metric ton, in 1917 and 1918 it brought 600 to 800 lire (about $80 to $110). Most of the present supply of coal comes from the United States; and as it is brought entirely under Government supervision, it is scarcely on the market at all for private consumption. The entire supply goes to meet the great needs of the war industries, shipping, and the State railways.

This serious situation has resulted in the following conditions, which are a natural result of the practical elimination of imported supplies:

(1) The destructive cutting of nearly all available forests, both young and of mature age, for fuel and other special purposes. Wood is being used in locomotives and all kinds of industrial plants for heat, light, and power, as well as for heating homes and for cooking purposes. This situation in itself, along with the severe cutting of all forest and timber reserves for war purposes, has an important bearing on the future need of imported lumber supplies.

(2) The development of the most accessible latent water-power properties to assist in the relief of the great demand for industrial and motive power. Northern Italy has already established a reputation for extensive development of water power for the operation of railways and municipal tram lines, industrial plants in the Milan, Genoa, and Turin districts, as well as for lighting throughout the northern section of the country.

(3) The extensive development of all lignite and peat properties. The production of lignite and a little peat in Italy increased, according to Government statistics, from 562,154 tons in normal times to 1,661,227 tons in 1917. The region about Florence contains the most important lignite fields, and three-fourths of all the lignite produced in Italy is from this district. The Società Mineraria ed Elettrica at Voldrano, near Florence, has increased its production of lignite from 1,100 tons prior to the war to over 3,400 tons per day at the present time. This is the largest single producer of lignite in the country.

Italy is best known as a producer of sulphur, of which over 2,371,000 tons are turned out annually in the rich sulphur fields of Sicily. It is also important in the production of mercury, zinc, and asphalt.

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The mining district of Florence (lignite, iron, and copper) is the largest consumer of lumber, using approximately 10,000,000 board feet annually. Prior to the war and during the period of the war this district has depended largely upon the local pine, poplar, chestnut, acacia, oak, and silver-fir stock, with a fairly good quantity of American yellow pine.

The local forests are being so seriously depleted that this district will offer a good market for American construction timbers through the port of Leghorn, which largely serves this section of central Italy. The principal demand is for timber from 6 by 6 up to 12 by 14 and occasionally 16 by 16 inches, and approximately 8, 12, and 20 feet in length. Boards and planking 2 to 3 inches in thickness and 12 to 18 feet in length will also be in demand.

The Sardinian district, which has 91 mines about Cagliari and 5 at Sassari (mostly iron), is the second in importance and consumes annually about 8,000,000 board feet of props, caps, and general-construction timber for miscellaneous purposes about the mines. It has depended largely upon the local live and white oaks, poplar, chestnut, eucalyptus, silver fir, and in fact almost anything that could be gotten together in the Provinces of Sardinia, Liguria, Tuscany, and Corsica. Much timber has been used here in the round, largely 8 to 18 inches in diameter, and 7 to 10 feet in length; also planks and deals 3 by 9, 3 by 10, and 3 by 12 inches and 10 to 16 feet in length.

The Milan district in the north consumes about 7,000,000 board feet per year and has depended upon the Ligurian pine, larch from the Italian Alps, fir from Tuscany, and chestnut and oak from Lombardy. Foreign sources will be depended upon after the war to supply this lumber.

Other important districts are the Umbria and Abruzzi fields about Rome, the sulphur fields of Sicily, and the Turin and Vicenza districts, all of which will look to foreign sources for their supply to a very large extent.

Most of the timber, planking, boards, etc., in the Italian mines are untreated, as the galleries are used but a short time. But for shoring up the main shafts and galleries that are in continuous use, durable species, such as the local live and white oaks and the American southern yellow pine have been used. Austria has no wood of durable qualities to offer outside of oak, which is used only for high-grade furniture, cars, etc.

Most of the engineers state that they prefer to buy their raw material in the rough and in large sizes so that they can work the material at the mines to the desired sizes. Few have standard dimensions and specifications that are adhered to over long periods of time. Each mine and each new extension or development requires timbers and lumber to suit the local requirements, so that the sizes do not remain constant.

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The following table shows the normal consumption of lumber in the various mining districts of Italy:

Mineral districts.	Annual consumption of wood.	Principal woods employed.	Sources.	Kinds of timbers.	Dimensions.
	Cubic meters.				*Meters.*
Bologna	5,000	Oak, larch, pine, poplar, chestnut, fir,[a] elm, hornbeam, ash, alder, pitch pine.	Umbria, Tuscany, Emilia, Italian Alps, Switzerland, United States.	Props (puntelli)	Length, 1.10, 2.50, 3, 4, and 6; diameter, 0.10–0.25.
				Crossbeams	Length, 3–6; cross section, 0.25–0.50.
				Planks	Length, 2–5; thickness, 0.02–0.06.
Caltanisetta	3,200	Pine, poplar, pitch pine.	Calabria, United States.	Props, large (tondizzi).	Diameter, 0.25.
				Boards	2 by 0.025 by 0.16–0.20.
Florence	20,000	Pine, poplar, acacia, chestnut, red oak, live oak, fir, pitch pine.	Tuscany, United States (pitch pine).	Logs (first 5 woods or nine-tenths of total).	Diameter, 0.15–0.30; length, 2, 4, 6.
				Boards (live oak, fir, pitch pine).	Thickness, 0.025–0.03.
				Planks (fir and pitch pine).	Thickness, 0.05.
Iglesias	17,270	Pine (8,000), live and white oak (5,500), poplar (1,500), chestnut (1,800), eucalyptus, fir, etc. (470)	Sardinia, Corsica, Liguria, Tuscany.	Props, small (gambe).	Diameter, 0.15; length, 2.25–2.50.
				Longitudinal sleepers.	Diameter, 0.17; length, 3.50–5.
				Caps	Diameter, 0.15; length, 1.25–1.50.
				Planks	2 by 0.25 by 0.06.
				Boards	2 by 0.20 by 0.025.
				Ties	1 by 0.08 by 0.08.
				Joists	1.60 by 0.12 by 0.18.
Milan	15,000	Pine (50 per cent), larch, fir, chestnut, white oak.	Liguria, Tuscany, Lombardy.	Props, small (gambe).	Diameter, 0.15–0.20; length, 2.20.
				Caps	Diameter, 0.15–0.20; length, 1.40.
Naples	1,690	Pine, chestnut, poplar, oak.	Avellino and Cosenza.	Props (puntelli)	Diameter, 0.15–020; length, 2.
				Planks and boards	2.12 by 0.30 by 0.06–0.025.
Rome	6,000	Oak, poplar, chestnut, pine, red oak, elm, walnut, mulberry.	Latium, Umbria, Abruzzi.	Props (puntelli)	Diameter, 0.10–0.22; length, 1–2.50.
				Stanchions for framework (montanti da telai).	Diameter, 0.15–0.25; length, 1.40–2.10.
				Caps and sills for framework (cappelli e soglie da telai).	Diameter, 0.15–0.25; length, 1.20–1.80.
				Boards for sheeting.	1.20–2.20 by 0.15 by 0.025–0.035.
				Ties for railroad tracks.	1.20–1.60 by 0.12 by 0.17.
Turin	12,000	Pine and larch (3,800), acacia (3,000), poplar (3,000), chestnut (1,200), white oak, alder, etc. (1,000).	Piedmont Alps, (pine and larch), Po Valley (acacia and poplar).	Props (puntelli)	Diameter, 0.14–0.20; length, 2–2.40.
				Planks	2–3 by 0.40 by 0.025–0.03.
Vicenza	7,500	Chestnut (5,000), pine (1,500), acacia and beech (1,000).	Adjacent woodlands.	Props (puntelli). (Trimming materials taken from odd pieces of props).	Average diameter, 0.17; length, 4.
				Planks (taken from timber sawn mostly on field of operation).	Thickness, 0.03.

[a] The Italian word is abete, which is used in Italy both for domestic fir and for imported spruce.

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VEHICLES.

There has been a most unusual war demand for vehicle lumber stock for artillery and gun carriages, munition wagons, supply trucks, automobile bodies, wheels, etc.

The vehicle industry in Italy ordinarily is characterized by a great number of small establishments and a relatively large amount of handwork in contrast to the conditions prevailing in the vehicle industry in the United States. It can not be said that the industry is centralized in any particular cities, except in the case of motor vehicles, in which the centers of production are Turin and Milan. Genoa and its busy manufacturing suburbs are probably as important in other phases of the vehicle industry as any other center.

Although the vehicle industry does not consume such large quantities of wood as most of the other industries, it is highly specialized in its demands for lumber, and, as is the case in the United States, considerable lumber is required for vehicle stock, not only for wagon bodies, but for spokes, hubs, rims, felloes, whiffletrees, poles, dashboards, etc. Considerable wood is still used for various kinds of horse-drawn vehicles in Italy. The two-wheel cart familiar in the southern Mediterranean countries is still used for transporting a large share of the merchandise.

The local lumber supply, which normally furnished a good share of the vehicle stock, has been nearly exhausted, and consequently after the war a large share of the vehicle stock must be imported. It is likely that more or less lumber of the following American woods will be required for vehicle purposes in Italy: Southern yellow pine, Douglas fir, hickory, white ash, cottonwood, yellow poplar, white oak, maple, and perhaps several others.

Italian walnut has been the preferred material for rims. It is steamed for four to six hours, and after being set in the bending form is regarded as the best available Italian wood. American bending machinery is in common use in Italy. For hubs local elm and live oak are used; for spokes local ash, elm, white oak, and locust or acacia. Occasionally some mulberry and live oak are used as well. Southern yellow pine is in common use for motor-truck and wagon bodies, especially for the bottoms, while the sides are sometimes made of local poplar.

During the war vehicle manufacturers in Italy have been forced to use local pine, Swiss spruce, and silver fir, as well as a great variety of miscellaneous hardwoods, which are distinctly inferior, for body purposes and other vehicle parts. Few vehicles have been made during the war period, almost the entire production of vehicle factories and shops being devoted to the output of vehicles and vehicle parts used by the Army.

Usually the raw material furnished to these factories is in the form of logs, timbers, flitches, or cants, planks, or deals, which are worked to suit the local requirements.

The following table shows the prices obtained for different kinds of wood at some of the larger vehicle factories, before the war and in 1918. Conversions have been made at 424 board feet to the cubic meter and at the normal rate (19.3 cents) for the lira before the war and at 13.5 cents in 1918:

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Species.	Prices before the war.		Prices in 1918.	
	Lire per cubic meter.	*Dollars per 1,000 feet.*	*Lire per cubic meter.*	*Dollars per 1,000 feet.*
Southern yellow pine	65- 80	30-36	400-600	127-191
Native beech	40- 50	18-23	200	64
Native poplar	70- 75	32-34	125-160	40- 51
Native walnut	120-150	55-68	350-400	111-127
Native ash	80- 85	36-39	150-200	48- 64
Native elm	80- 90	36-41	150-200	48- 64
Native white oak	70- 80	32-36	300-400	96-127

AIRPLANES.

For a long time Italy has been prominent in the manufacture of airplanes. Even before the war there were several establishments engaged in building machines. The industry developed very rapidly during the war, and Italy even supplied the French, American, and British Armies with planes. It is estimated that the total annual requirements for the construction of airplanes during the last two years of the war were about 100,000 cubic meters of imported lumber stock and about an equal amount of native Italian lumber. This would be equivalent to about 84,800,000 board feet used annually for airplanes alone. Furthermore, the amount was rapidly increasing and probably would have been greatly exceeded if the war had continued. The manufacture of air machines entailed a great waste of raw materials. The imported stock from the United States was carefully inspected at the point of production as well as at the shipping port, and yet at the factories great quantities were lost in turning out the final product.

A good share of the imported material came from the United States during the years 1917 and 1918, and both Douglas fir and Washington spruce have established a great reputation. It is likely that the excellent reputation acquired by the former wood for airplane purposes will be of great assistance in its future use through Italy for general construction purposes. Both woods were regarded with the greatest favor and satisfaction, and the Washington spruce was especially approved by the Italian manufacturers and Government officials because of the excellent straight grain, the freedom from knots and other defects, the comparative lightness, combined with strength and flexibility, and the large sizes obtainable. In fact, these woods were the only ones used for wing beams. Other American woods used for airplanes were selected stock of Southern yellow pine and red gum. So great has become the demand for lumber for flying machines that a great variety of local woods have been called in to meet it. American woods, however, have been much preferred.

The centers of the industry have been at or in the environs of Turin, Milan, Genoa, Florence, and Palermo. Important plants and furniture factories employed in the manufacture of airplane parts were located at Rome, Naples, Pistoia, and many other centers. Many different types have been developed for both airplanes and hydroplanes, and the use of wood varies in the construction of bombing planes, scout planes, and fighting planes.

The Government officials and manufacturers were becoming very anxious about the available lumber supply, because all the important

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woods had to be imported, and the native lumber stocks were becoming so depleted of clear stock that many woods formerly considered undesirable or unsatisfactory had to be used for airplanes. The principal dependence was upon American western spruce and Douglas fir, but the supply was so limited that these woods were used only for large framing and wing-beam purposes. The inside frame of the wings was made largely of Italian poplar, which is stronger and better than the American cottonwood, but it was becoming exceedingly difficult to obtain sufficient clear stock of this wood. American red gum also was used occasionally for this purpose.

The engine supports, fuselage framing, and wing struts and stays were largely of Italian ash, and efforts were being made, on account of the extreme scarcity of the Italian wood, to obtain white ash from the United States. The bodies of the airplanes and hydroplanes, as well as the hydroplane floats, had been covered in the past with three-ply, built-up veneer of Russian birch, shipped to Italy via England in thicknesses of 2, 3, 4, and 5 millimeters. This veneer cost 20 to 25 lire per square meter (about 31 to 38 cents per square foot, at 16.5 cents to the lire), in the early days of Italy's part in the war, delivered at the factory in Italy. When this supply gave out, Italian walnut, native ash, mahogany, and beech veneer were employed for this purpose. Propellers were formerly made entirely of Italian walnut, which is excellent for the purpose. However, the supply was becoming so scarce that mahogany, local ash, and even beech were employed for this purpose. The propellers were made almost entirely in separate furniture factories, and the general type and design followed the same lines that were used in this country; they were almost entirely double-bladed propellers, built up from boards about 1 inch in thickness and cut from carefully selected lumber, which had previously been kiln-dried to an average uniform moisture content of 6 to 8 per cent. After these laminations were glued together and the products left in presses for about a day, they were cut down to the finished shape, by both hand and machine shapers. They were finished with the greatest care. For the rudders of hydroplanes, local ash, poplar, maple, and red gum were used. It is said that every hydroplane required the following amounts of selected lumber in the rough: Two cubic meters (848 board feet) of silver spruce or Douglas fir, which were used interchangeably; 4 cubic meters (1,696 board feet) of Italian poplar; 2 cubic meters of ash, and 70 square meters (753 square feet) of veneered stock. With the exception of the veneer, only 15 to 30 per cent of all the large amount of lumber, even after being carefully selected as the result of at least three different inspections, found its way ultimately into the airplane. There has recently been a movement on foot to import Douglas fir and western spruce in sizes approximating those that are ultimately used, on account of the great amount of waste experienced in resawing and general conversion.

The value of lumber used for airplanes in Italy has risen enormously since the outbreak of the war, increased prices of 200 to 400 per cent and more being commonly quoted. The following table shows the prices for airplane lumber in Italy before the war and in 1918. Lire have been converted at the normal rate of 19.3 cents for

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pre-war prices and 13.5 cents for 1918 prices; quantities have been converted at 424 board feet to the cubic meter.

Species.	Prices before war.		Prices in 1918.	
	Lire per cubic meter.	*Dollars per M feet.*	*Lire per cubic meter.*	*Dollars per M feet.*
Washington spruce	(a)		1,500–1,700	478–542
Italian walnut	150–160	68– 73	600– 800	191–255
American red gum	150–230	68–105	500– 700	159–223
Beech, native	110–120	50– 55	300	96
Beech, steamed (Austrian)	220–230	100–105	(b)	(b)
Mahogany (West Indian)	c 300–350	d 105–123	c 1,600	d 392
Italian ash	(a)		450– 500	143–159
Italian poplar	120–130	55– 59	270	86
Douglas fir	(a)		1,500–1,700	478–542
American yellow pine	85	39	600– 900	191–287

a None used.
b None available.
c Per metric ton.
d Converted at 551 board feet to the metric ton.

The following table shows the specific gravity and the resistance to deflection of the principal woods used for airplane purposes in Italy:

Species.	Resistance to deflection.	Specific gravity.	Species.	Resistance to deflection.	Specific gravity.
	Kilos per square meter.			*Kilos per square meter.*	
Italian ash	700–850	0.70–0.78	Douglas fir	500–550	0.55
Italian walnut	700–800	.70	Washington spruce	380–450	.45
Italian spruce	350–450	.45	Italian poplar	300–400	.48

Italian spruce and silver fir have not entered prominently into airplane construction, because clear stock was scarce and the lumber generally defective and knotty. Comparatively small quantities of spruce and fir were used in small pieces for interior framing, for which poplar was the principal material.

It is likely that airplane construction will be continued after the war; mail and other routes had been established even before the end of the war. There will probably be needed annually 15,000,000 to 20,000,000 board feet of lumber for airplanes and hydroplanes, a large share of which must be imported. Austria has no good airplane wood to offer, and the United States will supply most of the Douglas fir and Washington spruce, which are the principal woods desired.

MUSICAL INSTRUMENTS.

Italy occupies an important position among the European countries in the manufacture of musical instruments, particularly high-grade violins, mandolins, and guitars. It is also important in the manufacture of pianos, organs, and harps. Definite figures have never been compiled to show the amount of lumber consumed in the manufacture of musical instruments in Italy, but the amount probably aggregates several million board feet annually. Only clear lumber and high-grade stock can be used in this industry.

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Most of the lumber used goes into pianos and organs, the manufacture of which is centralized in Turin, Florence, and Padua. A great number of small plants distributed over Italy are engaged in the manufacture of various kinds and parts of musical instruments. The center of manufacture of violins is in Catania and Naples. Catania produces a great variety of smaller musical instruments and the normal production is said to be about 300,000 mandolins, guitars, and violins annually. These are exported very widely, the largest number going to Russia, Germany, and Hungary, where they are held in high esteem. In normal times these instruments are also exported to France, England, the United States, and the Balkans.

Italy imports some of the cheaper varieties of pianos from Germany and France and is also engaged in the exportation of pianos to South America, particularly to the prominent Italian colonies in Brazil and Argentina.

Austrian spruce has been the principal wood employed in the manufacture of musical instruments. Its chief use is for the sounding boards of pianos and for organ pipes, on account of its resonant qualities. It is also used for ribbing and miscellaneous purposes in the smaller instruments. The best qualities of Austrian spruce are carefully selected to secure portions free from knots, pitch streaks, and other defects. Possibly Washington spruce may be exported to Italy to serve this purpose in the future.

Native poplar and basswood and California white pine and the northern white pine of the United States have been used for piano keys, and native maple and ash for piano actions and keyboards. Piano cases are made of Italian walnut, mahogany, and American red gum and rosewood. Native ash and beech and American yellow pine are used for the backs of pianos and organs, while crating and boxing for shipment to both Italian and foreign destinations consume large quantities of local pine and fir, Austrian spruce, and American yellow pine.

The depletion of the Italian forests during the war, particularly as affecting the future production of maple, walnut, ash, and basswood, will have an important bearing upon the use of American woods in the musical-instrument industry of Italy. It is likely that this industry will employ at least small amounts of American woods, such as red gum, California white pine, southern yellow pine, northern white pine, maple, white ash, and western spruce.

The following figures shows the value of the imports of musical instruments into the United States from Italy during the five years ended June 30, 1918: 1914—$58,598; 1915—$53,858; 1916—$65,643; 1917—$72,526; 1918—$52,326.

OTHER WOOD-USING INDUSTRIES.

Aside from the principal wood-using industries already briefly described, a number of other industries require more or less wood and a description of some of these follows. Although most of these industries were unimportant to the American lumber exporters prior to the war, the depletion of the local Italian forests, which furnished most of this material, will probably force these manufacturers to turn to American woods.

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Machinery, handles, and tools.—Formerly the native red and white oaks, beech, ash, and some imported mahogany and southern yellow pine were required for various kinds of machinery, implements, tools, and tool handles. After the war there will be a market not only for American yellow pine, Douglas fir, and white oak, but for hickory, white ash, and hard maple, and perhaps other varieties of American woods as well.

American woods of special characteristics will be needed in this field, the particular requirements being hardness, toughness, strength, and durability. The wood will be used not only for handles of all kinds, but for parts of hoists, cranes, presses, drills, and various kinds of agricultural, electrical, and other machinery. Even in large steel foundries, machinery plants, and implement works considerable quantities of wood are required for handles, foundations, supports, and various other parts. The most important markets for lumber of this kind are in Genoa and its busy manufacturing suburbs, and in Turin, Milan, Naples, and Florence.

It is estimated that in the Turin district alone 1,000,000 handles are used annually for shovels, spades, axes, pickaxes, hammers, rakes, and various other tools. Agricultural handles are often made in the country by the peasants, who make them as they are needed. These and the factory-made tools are 90 to 100 centimeters (1 centimeter = 0.3937 inch) long and 6 by 3 centimeters in cross section. These brought $5 to $7 per hundred before the war. One factory has an annual capacity of 300,000 handles. English and German machinery was formerly used to make these handles, but American machinery has rapidly entered the market. It is likely that Italy will import this stock in the rough and work it up to suit its own requirements. Hammer and ax handles vary in length from 35 and 45 and up to 55 centimeters, and special prices are quoted for each length in normal times.

Patterns and flasks.—For patterns and flasks, in which a wood of soft, even grain, ready workability, and excellent seasoning qualities is particularly required, imported mahogany and native walnut, basswood, and poplar have been used. It is necessary also that the woods used shall not warp, shrink, or check readily. Consequently California sugar pine, white pine, basswood, and yellow poplar might be sent to Italy from the United States for this purpose.

Woodenware, toys, and novelties.—Native beech, maple, white and red oaks, poplar, and spruce have furnished the raw material for woodenware, toys, and novelties. Imported lumber will probably not be used to any considerable extent for these purposes, as the raw material is not necessarily of specialized character and can be furnished even from limited forest resources.

Trunks.—Trunks are made of native spruce and silver fir, Austrian spruce, and native basswood. Considerable quantities of trunks are manufactured in Italy, and more or less wood is required in their construction.

Spars and masts.—Heretofore Corsican pine has supplied the major portion of the spars and masts required in Italy, though to a limited extent southern yellow pine, Douglas fir, and local fir also have been used. With the increase in shipbuilding activities and the depletion of the Corsican and native timber supplies, Douglas fir and yellow

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pine will have to be imported largely for this purpose. In 1913, 80 shillings per load of 50 cubic feet ($39 per 1,000 board feet), c. i. f Genoa, was paid for hewn masts 45 to 60 feet in length.

Wood carving.—Wood carving probably assumes greater importance in Italy than in any of the other European nations. Although the total amount of lumber consumed for this purpose is not large, wood carving is of interest in connection with the larger aspects of the subject, because it requires woods of special qualifications. In the cathedrals and churches throughout Italy one commonly finds large and handsome wood carvings in Italian walnut and Slavonian white oak, with some in mahogany, ebony, teak, and pear wood. One of the local pines, called Cembran pine, from the Alps, produces a light, easily-seasoned wood that is used for carved frames and to some extent for carved Florentine furniture. Most of the wood carvings are in the form of large, handsome doors, interior trim, paneled framing, decorative posts, and decorative woodwork used in the more pretentious structures and public buildings. Wood carving is much more general than in the United States. Its home may be said to be in Italy, where one finds excellent wood carvings commonly in cathedrals, clubs, villas, public buildings, and institutions throughout the country. Some of the most exquisite and delicately finished work is found in Venice, Rome, Florence, and Palermo.

Other purposes for which lumber is required are scientific instruments, veneers, matches, excelsior, boot and shoe findings, pulleys, shuttles and bobbins, frames, ladders, brushes, dowels, etc. The total needed for these industries, however, is comparatively small.

The United States has developed a much greater proficiency in the manufacture of practically all these miscellaneous articles than exists anywhere in Europe, except where careful, accurate manual labor is required, such as in wood carving, inlaid work, furniture, parquetry flooring, and certain forms of matched work. In general woodworking the larger experience and greater variety of product in the United States doubtless account for the fact that the Italian industries seem primitive both in methods and in the character of the products, when contrasted with the American wood-using industries.

USE OF LUMBER BY ITALIAN STATE RAILWAYS.

One of the most important demands for lumber after the war will be to supply the needs of lumber, crossties, etc., for general repairs, maintenance, railway stations, bridging, etc., by the Italian State railways. These railways do not build their own cars, but they purchase all their own crossties for the 12,500 miles of track, and large quantities of timber for bridging, terminals, maintenance of way, and general repair purposes.

The Italian railways have been called upon to meet an especially burdensome and difficult situation, since they have to some extent depended upon foreign sources for their materials for car construction, crossties, and timber for maintenance and repairs, and these sources have been largely eliminated since the war started, through the lack of ocean tonnage, shipping facilities, etc. Moveover, the war has made especially urgent demands in the way of transportation of troops and war supplies, in addition to the normal business. Furthermore, Italy had become a great highway for troops, munitions, and

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supplies for Greece, Egypt, Mesopotamia, Palestine, and Macedonia. The roadbed, rolling stock, terminals, new extensions, etc., have been more or less neglected in consequence of the more important current demands of transportation.

In contrast to the recent demand in the United States for a change in the material used for passenger coaches and freight cars from wood to steel or part steel (at least as affecting the superstructure of these cars), the Italian as well as other European railways have retained the wooden cars, and the officials have shown no disposition to change.

The annual requirements for the State railways are approximately 3,000,000 crossties. Prior to the war these were supplied largely from the native white oak of Italy. However, a shortage was even then becoming apparent, and attempts had been made to purchase ties from the Black Sea region about Odessa, as well as from Albania. These sources of supply proved, however, to be both insufficient and unsatisfactory for several reasons, and contracts were made for 1,450,000 hardwood ties of a great variety of tropical woods from Brazil. Difficulties arose over the questions of delivery and identity, and the result was that none were actually delivered.

After the war it is likely that between 4,000,000 and 6,000,000 ties will be needed annually in Italy, because the entire railway system must be thoroughly gone over and the replacements will be exceedingly large.

Since the beginning of the war, owing to the serious shortage of available white oak, red oak and beech, and even local pine, elm, and eucalyptus have been called in to help meet the demand. But even so, the supply is wholly insufficient. This situation is plainly reflected in the prices now being paid for ties. The rise has been more than 100 per cent above the pre-war price levels. Italian white-oak ties in 1918 brought around 12.50 lire ($1.70), whereas only 4.50 lire ($0.85) was formerly paid per tie. The following list shows the prices per tie paid before the war and in 1918 by the State-railway system. All are native-grown stock. Conversions for prices before the war have been made at the normal rate of 19.3 cents to the lira, and for prices in 1918 at 13.5 cents to the lira.

Kinds of ties.	Prices before war.		Prices in June, 1918.	
	Lire.		*Lire.*	
White oak	6.00	$1.15	13.50	$1.80
Red oak	4.50	.85	12.50	1.70
Beech	6.00	1.15	12.50	1.70
Pine	5.00	.95	12.00	1.60
Elm	4.50	.85	12.50	1.70
Eucalyptus	4.50	.85	12.50	1.70

It is to be noted that only white oak and a little red oak and beech were used before the war and pine, elm, and eucalyptus scarcely at all. All ties except white oak must be treated before being used in the track. Details of the preservative treatment, such as costs, methods, materials of penetration, etc., will be given later.

Estimates, based on actual tests, of the average life of untreated ties of different woods are as follows: White oak, 10 years; red oak, 4 years; beech, 2 years; pine, 5 to 6 years; elm, 4 to 5 years; eucalyptus, 4 to 7 years.

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Specifications of Italian railway ties are somewhat similar to those required on American standard railways. The chief difference is that the upper part of the tie is beveled, thus allowing two ties to be frequently cut from a tree or log where otherwise, under American requirements, only one could be cut. All ties are cut according to the metric system.

The No. 1 white-oak ties are approximately of the following sizes: Length, 2.60 meters (1 meter = 3.28 feet); width of the base, 24 centimeters (1 centimeter = 0.3937 inch), and of the top, 18 centimeters; thickness, 14 centimeters. The bevel commences at a point 10 centimeters above the base. The specifications of the Direzione Generale of the Italian city railways call for the same dimensions for crossties. The specifications for No. 2 crossties are as follows: Length, 2.51 meters; width, 23 centimeters; thickness, 13.5 centimeters.

Italian railway officials are looking to the United States to supply a large share of their crosstie material because the Italian forests have been practically exhausted and Austrian oak commands a price that is prohibitive for crosstie material.

Since the war started Italy has purchased from the United States 3,000 coal cars of 20 tons' capacity each. It is estimated that 50,000 freight cars of all designs are needed at once, but the materials (lumber, iron, and steel) are lacking. After the war the whole railway system will need heavy construction timbers, 11 by 11 inches and up and 20 to 40 feet long, and lumber of both hardwoods and softwoods in large amounts, doubtless running into many millions of feet, for repairs, maintenance of way, rolling stock, terminals, stations, concrete work, bridging, new construction, etc.

Austria has no construction lumber to meet this demand. Its great export lumber, spruce, is too light, weak, and perishable for the purpose, and its hardwoods are unsuitable, the beech being unsatisfactory for interior trim and finish and the Slavonian oak generally too expensive for railway and car construction work. Baltic pine and spruce are almost equally unsuited for railway purposes. With these two foreign sources practically eliminated and the native Italian timber supply practically wiped out, the field is largely open for American timber and lumber.

Italy normally imported about 250,000 ties, of which 200,000 were of Austrian beech and 50,000 of Austrian oak. The oak was white oak from the Provinces adjoining the Adriatic Sea and was not of as good quality as that from Slavonia. The normal prices paid for the Austrian crossties were 2½ to 3 crowns, or, roughly, $0.50 to $0.60 each, f. o. b. Fiume, for the beech ties, and 4½ to 5 crowns, roughly, $0.90 to $1 each, for white-oak crossties.

For information regarding the treatment of railroad crossties in Italy, the duration and life as a result of this treatment, and its cost, see discussion under "Wood preservation" (p. 152).

The following shows the terms of contract offered by the general management of the Italian State railways for the supplying from foreign countries of white-oak ties for railways (edition of 1912):

ART. 1. *Object of the agreement.*—The present agreement has for its object the determination of the clauses and conditions for the supplying from foreign countries of white-oak crossties for laying permanent railways, as required by the State.

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ART. 2. *Quality and source of the timber.*—The ties to be furnished shall be of white oak. The large-leaved oak will be admitted also, provided the fiber is hard and compact. The red oak is absolutely excluded.

They should be taken from live timber, of standard size, hard and compact fiber, perfectly sound, of the best quality, and cut not more than a year in a propitious season when the sap is not circulating.

Furthermore, they should be free from bark, decay, dote, dry rot, wormholes, excessive knots, rust, twisted fibers, frost shakes, brashy structure, or splits; free, in short, from any defect detracting from their durability and resistance.

They should be free from sapwood except for allowances admitted in Art. 5.

Crossties will not be accepted if taken from trees grown in alluvial, sandy, or marshy ground, nor ties taken from branches or from trees too young, whose cross section will yield only one single tie with wood not yet completely formed with all the edges as prescribed.

Ties, straight or curved, will not be accepted if they are taken from trunks presenting a warped fiber and cut obliquely; nor those having a crack extending over half of the thickness or width of the tie, even at only one end.

The contractor in his bid, or, at all events, within 15 days before beginning to fell the trees, should indicate the locality where the trees are found from which the ties are to be taken, and the Administration reserves to itself the right to have them looked over by its own agent, who will have the right also to inspect the work and will make all the investigation necessary in order to be assured that as far as the quality of the wood and its preparation are concerned, the contractor carries out the conditions of the present agreement.

ART. 3. *Form and preparation of the ties.*—The ties shall be rectangular in section, prismatic in form, and straight and squared. Therefore they will have, as a rule, even surfaces and sharp edges, aside from exceptions consented to in Art. 5.

The large upper and lower surfaces and the ends should be sawed, apart from exceptions stated in said Art. 5.

The two other faces may be hewn with the ax. Furthermore, the ends should conform to the longitudinal axis of the ties.

ART. 4. *Dimensions of the ties.*—The ties, in order to be accepted as standard (first category) should have the following minimum dimensions: Length, 2.60 meters; width, 0.24 meter; thickness, 0.14 meter. The dimensions should be verified at the time the ties are received, and for this reason the contractor at the time of preparing them should allow for natural shrinkage.

The price of the ties being fixed according to number and not by cubic measure, no credit will be given the contractor for quantity of timber in excess of the volume resulting from the standard dimensions specified.

ART. 5. *Allowances.*—(*a*) Dimensions: It is admitted that the dimensions may be as low as the following: Length, 2.51 meters; width, 0.22 meter. The thickness may not be less than 0.14 meter. However, every tie may be deficient in one dimension only, which will be conceded if the tie has not less than six months of seasoning.

The number of ties having a deficient dimension should not exceed 50 per cent of the total number of ties accepted.

(*b*) Wane and sapwood: No wane nor sapwood will be allowed for the edges of the lower surface of the ties. For the edges of the upper surface, wane as well as sapwood will be admitted, provided the surface of the squared portion free from sapwood be not less than 14 by 30 centimeters for the support of the tie plates, bearings, or rails, and 12 centimeters for the remainder.

(*c*) Curves: The lateral faces of the ties must be straight so far as possible. However, a horizontal curve will be admitted provided the versed sine of the arc is not greater than 13 centimeters; but these ties must not exceed 10 per cent of the total number accepted as belonging to the first category.

(*d*) Evenness of the surface: Ties which, in addition to the two sides, have the upper and lower surfaces hewn with the ax may be accepted provided they are, in the judgment of the inspector, sufficiently straight and regular.

Ties may also be accepted whose extremities are only partly even, provided that the even portion presents a surface not less than that of a rectangle of 16 by 10 centimeters.

ART. 6. *Ties of second category.*—In order to facilitate the work, ties of the second category may be accepted whose dimensions are not less than the following: Length, 2.45 meters; width, 0.22 meter; thickness, 0.125 meter—provided the straight portion, free from sapwood, of the top surface be not less than 0.12 meter in width for the supports and 0.10 meter for the remainder and provided that the quality and the preparation of the wood correspond to the conditions required for crossties of the

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first category. For a quantity of ties not to exceed 25 per cent of the second category, a horizontal curve will be admitted, provided the versed sine of the arc does not exceed 14 centimeters.

The quantity of ties of the second category may not exceed 10 per cent of the entire amount, and they shall be paid for at a rate of 0.90 lira less than the price fixed for each tie of standard dimensions.

ART. 7. *Temporary inspection of the ties.*—The Administration of the State railways reserves the right of arranging from time to time for the temporary inspection of the ties, to be previously arranged with the contractor, and, if not otherwise determined in the contract, to be conducted at the coast or port of embarking for crossties imported by sea, or in the foreign stations of consignment for those imported directly by rail. The inspection will be in quantities to be determined, which in any case are not to be less than 10,000 crossties and in lots of 1,000 for each locality.

All the expenses incidental to removing the ties to be inspected or to be assorted are to be borne by the contractor.

If, in order to show up certain defects, it should be necessary to cut open the ties in the points considered defective, the contractor can not claim any indemnification for ties treated in this manner.

The accepted crossties shall be dry-marked on both sides, in the presence of the contractor or his representative, with the mark $\frac{\text{F. S.}}{1}$, if of the first category, and $\frac{\text{F. S.}}{2}$ if belonging to the second.

The contractor, personally or by means of his representative, the name of whom shall be indicated in the request for inspection, must be present at every inspection and should place, at his own expense, an interpreter at the disposition of the inspector. The acceptance of the furnished material is reserved exclusively to the inspector of the Railway Administration, and the contractor may not in any way impugn the result of the inspection. Even in case of disagreement, he is always bound to conform to the decisions, whatever they may be, of the inspector, without suspending or delaying the regular progress of the supplies themselves. He has only the right to make a written statement of his case, to be presented within 15 days to the General Management of the State Railway, Construction Service, Rome.

The request for inspection should always be sent directly to said Construction Service at least 20 days before the beginning of the inspection.

The dates for consigning the supplies, fixed by the contract, do not refer to the dates of the temporary inspections, of which no report shall be submitted, but to the effective consignment in the ports of entry and in the stations at the frontier, of which an official report shall be compiled based upon the results of the final inspection as shown in Art. 8.

ART. 8. *Consignment of the crossties.*—The ties to be imported by sea must be consigned by the contractor free of every charge, delivery of merchandise to be made in Italian ports determined in the contract, and deposited in front of the tracks of the maritime stations of the State railways.

The contractor must at once telegraph information to the Railroad Administration of the sailing of the steamers or ships from the ports or coast of embarkation, communicating also the number of crossties on board.

The unloading of the ties from the steamers or ships must be arranged by the contractor in the freight contract according to the local customs and conditions of the port of arrival, alike for the average quantity to be unloaded each day and the standard of hours and working days decided upon for each port, and the Administration shall not be obliged to proceed to the unloading of the ties to be delivered, except for said average quantity and during certain hours and days. At the act of making the delivery of merchandise, the unloaded ties shall be subject to the acknowledgment and definitive inspection to attest the number and to see whether all bear the mark of temporary inspection and whether any are broken or spoiled, either by injury received in transport or from lying too long in the dockyards or in the port of embarkation after the temporary inspection.

The ties failing to bear the mark of inspection or altered marks, and those broken or spoiled shall be rejected and left upon the ground at the disposition of the contractor, who must provide for their removal at his own care and expense.

The ties imported by rail must be consigned by the contractor free of every charge at the frontier station and loaded in cars belonging to the system of the State railways.

For such ties the acknowledgment or definitive inspection as before indicated shall be executed directly at the stations of the State-railway system and thence they shall be reshipped by the Railway Administration.

The contractor must notify in time the offices of the Railroad Administration of the shipment of the carloads. The ties that may be refused in the transaction of unload-

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ing the cars at final destination, shall remain at the disposition of the contractor, who must attend to removing them at his own care and expense within 10 days of the notice from the Administration. If such ties are not taken away within said period of time, they will be subject to the regular storage charges fixed in the regulations and tariffs for transports within the authority of the State railways. If after three months from the date above indicated, the ties are not removed, they will be regarded as having been abandoned by the contractor and will become the property of the Railway Administration.

ART. 9. *Penalty for delays.*—When delivery in Italian ports or in carloads at the frontier stations is made after the dates fixed by the contract, the contractor will be subject to a fine computed at the rate of 1 per cent of the value of the lot not consigned in time, for every month of delay and proportionately per fraction of a month.

The fines shall be liquidated and retained at the end of the furnishing of supplies, from the order of payment in settlement of same, and where this does not present sufficient margin, the difference shall be taken from the security bond deposited as in Art. 10.

In addition, when on account of the contracting agent, the Administration fails to have at its disposal the quantity of supplies of which it is in need at a given time, it will have the right to provide same, whatever may be the contract or economy involved, as it may deem opportune, at the risk and expense of the contracting agent, without public notice or judicial proceedings of any sort.

The amount acquired at the risk and augmented expense of the contractor shall be deducted from the total quantity included in the contract.

The Railway Administration will thus have the right in every case to indemnification for every expense and loss incurred in the complete or even partial failure to carry out the terms of the contract.

Any sum for which the contractor may be indebted to the Administration by the effect of the application of the present agreement will be withheld at the time of payments due to the contractor for material furnished or for any other reason. When the amount of the payments due the contractor is insufficient, he will be notified to present himself at once to pay off his indebtedness. If he fails to do so, the Railway Administration will be deemed to have a claim on the deposit made by the contractor, as in Art. 10, without prejudice to any excess liability on his part when the security is not sufficient, and the Administration itself can also proceed according to Art. 458 of the Commerce Code of the Italian Kingdom.

ART. 10. *Security.*—As a guaranty of the exact fulfillment of the obligations assumed by the contractor by this present agreement, the contracting firm must, within 20 days of the request of the Administration, furnish a surety bond for one-twentieth of the amount of the supplies. The surety bond should be in legal Italian securities, convertible Government or railway bonds, or other holdings guaranteed by the Italian Government, at the price quoted in the Stock Exchange the day before the deposit is made, every other security or stock to be excluded.

The security should be turned over directly by the contractor or by his delegate or representative to the Deposit and Loan Bank and legally drawn up in favor of the Railway Administration.

In order that such deposit may be effected, the contractor will receive from the Administration a letter certifying to his share in the contract, which letter should be exhibited at the bank named and by the bank at one of the official bureaus for the registration of the claim on the deposit. The temporary receipt for the deposit should be turned over to the general management of the Railway Administration Supply Service in Rome, within 20 days from the date of the granting of the contract for supplies.

Such receipt shall be returned to the contractor in order that it may be replaced with the final certificate, which must remain in the custody of the said general management until the time that the deposit may be redeemed. Such release of the deposit in bond will take place when the contractor shall have exactly and completely executed the consignment of all the ties contracted for and after they have been received and checked up by the agents of the State Railway, in conformity to Art. 8, and after all questions and misunderstandings, if any, have been cleared up.

ART. 11. *Interdiction of cessions.*—The contractor is absolutely debarred from making cessions or subleases for the accomplishment of the obligations assumed by accepting this present agreement, without the written authorization of the Railway Administration.

ART. 12. *Bills and payments.*—Very soon after the dispatch of each steamer or ship from ports of embarkation the contractor must transmit by registered letter to the general management of the State Railways Supply Service in Rome a copy of

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the bill of lading, together with the invoice, the original and copy. The letter must state the quantity and marks of the ties shipped by steamer or vessel, the price per unit, and the amount.

For ties imported by rail every invoice, including original and copy, presented by the contractor must involve the dispatching of at least 50 carloads of ties, with a total number of not less than 5,000.

Payments will be made based on the number of ties accepted as a result of the official report of the definitive inspection, said report to be compiled by the agents of the Railway Administration, after the ties have been formally accepted in the ports and stations of arrival.

When not otherwise determined in the contract, payments will be made as soon as the necessary formalities of the Administration can be attended to, as a rule at the end of 60 days from the date of the definitive inspection of every lot.

Payments will be made in legal Italian securities in one of the following ways, to be selected by the Railway Administration: By means of sight drafts upon one of the Administration's financial offices which will be indicated by the accountant's office—drafts which in any event may not be placed in circulation by the contractor until authorization of the accountant's office of the Railway Administration has been given; or by payments at the Bank of Italy, or at the aforesaid financial office, or at the stations of the State railways, in which case the contractor must appoint a legal representative in Italy with power of attorney to demand payment and give receipt for same.

ART. 13. *Legal domicile and representation.*—For all the effects of this contract, the contractor must elect legal domicile in Rome with a person or house which he shall make known in his proposal. In default of this, the contractor will be regarded as domiciled at the City Hall in Rome.

No one will be admitted as having the right to sign the contract in representation of the supplying agent, unless presenting special and authentic power of attorney, enabling him to accept explicitly all the clauses and conditions of the present agreement. The person, house, or bank, coming as delegated by the contractor to make collections in his behalf or interests, must present special order for demanding payment and render receipt in legal form.

ART. 14. *Approval of the contract.*—The final contract, to be drawn up after the award has been made, will be binding on the contractor from the moment he signs, but will not be binding on the Railway Administration until after it has received official approval in terms of the law.

The contractor is obliged, however, to begin furnishing supplies, whenever the Administration gives order for same, pending the drawing up and approval of the contract.

ART. 15. *Expense.*—All the costs of contract, registering and sealing, and even stamping the acts of inspection shall be borne by the contractor.

The following are the terms of agreement issued by the general management of the Italian State railways for supplying red-oak ties to be taken from Italian forests (edition of 1912):

ART. 1. *Object of the agreement.*—The present agreement has for its object the specifying of clauses and conditions for the supplying of red-oak ties for laying permanent railways required by the Government.

ART. 2. *Quality and source of the timber.*—The crossties to be furnished shall be of red oak taken from woodland regions in Italy.

They should be taken from live timber, of standard growth, hard and compact fiber, perfectly sound, of the best quality, and cut not more than six months in a propitious season, when the sap is not circulating.

Furthermore, they should be free from bark, decay, dote, dry rot, wormholes, excessive knots, rust, twisted fibers, frost shakes, brashy structure, splits; free, in short, from any defect detracting from their durability and resistance.

Crossties taken from trees grown in alluvial, sandy, or marshy ground will not be accepted, nor ties taken from branches or trees too young.

Ties, straight or curved, will not be accepted if they are cut from logs presenting a warped fiber and cut obliquely; nor crossties having a crack at even one of the extremities extending over more than half of the thickness or the width of the tie.

The contractor in his bid, or at least within 15 days before beginning to fell the trees, should indicate the locality of the trees from which the ties are to be taken, the Administration reserving the right to have them looked over by its own agent, who will have also the right of inspecting the work and will make all the investigation necessary in order to be assured that as far as the quality of the wood and its preparation are concerned, the contractor carries out the conditions of the present agreement.

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ART. 3. *Form and preparation of the ties.*—The ties shall be rectangular in section, of prismatic form, and straight and squared; thus they will have, as a rule, even surfaces and sharp edges, apart from exceptions consented to in Art. 5.

The large upper and lower surfaces and the ends should be made even with the saw, apart from exceptions stated in said Art. 5.

The other two faces may be hewn with the ax. Furthermore, the ends should conform to the longitudinal axis of the ties.

ART. 4. *Dimensions.*—The ties, in order to be accepted, should have, except tolerances admitted in Art. 5, the following minimum dimensions: Length, 2.60 meters; width, 0.24 meter; thickness, 0.14 meter. The dimensions should be verified at the time the ties are received and for this reason the contractor, at the time of preparing the ties, should allow for natural shrinkage.

The price of the ties being fixed according to number and not by cubic measure, no credit will be given the contractor for quantity of timber in excess of the volume resulting from the standard dimensions specified.

ART. 5. *Allowances.*—(*a*) Dimensions: It is admitted that the dimensions may be as low as the following: Length, 2.51 meters; width, 0.23 meter; thickness, 0.135 meter. The number of ties deficient even in a single dimension must not exceed 20 per cent of the total number of ties accepted.

Ties whose dimensions of width or thickness are deficient will not be accepted unless they have about six months of seasoning.

(*b*) Wane: For the edges of the lower surface of the ties, no wane or chamfered edges will be allowed. For the edges of the upper surface, wane will be allowed, provided the surface of the level portion be not less than 14 centimeters in width by 30 centimeters in length in relation to the support of tie-plates, bearings, or rails.

(*c*) Curves: The sides of the ties must be straight so far as possible. However, a horizontal curve will be admitted with a versed sine not greater than 13 centimeters; but these ties must not exceed 10 per cent of the total number of ties accepted.

(*d*) Evenness of surface: Ties which, in addition to the two sides, have the upper and lower surfaces hewn with the ax, may be accepted provided they are, in the judgment of the inspector, sufficiently straight and regular.

Ties may also be accepted whose extremities are only partly even, provided the even part has an extent not less than that of a rectangle of 16 by 10 centimeters.

ART. 6. *Mode of consignment, reimbursement of expense, and inspection.*—The crossties must be consigned by the contracting agent free of every charge in the stations of the State system, including stations used by other administrations but administered by the State, where the inspections will be made.

Those stations are not included in which, according to the judgment of the Railway Administration, local conditions or special requirements of the service make it inexpedient to deposit the ties, nor stations of these lines: Varese-Porto Ceresio, of the Secondary Roman Railway, the Roma Trastevere-Viterbo, and branch Capranica-Ronciglione. The stations of Varese, Roma-Trastevere, and Viterbo Porta Fiorentina, instead, will be admitted.

The ties should be deposited in areas to be specified by agents of the Railway Administration and arranged in a manner to be easily measured and inspected.

In order to have the use of the areas as places of deposit, it is necessary to give the station chief the number and date of the contract, or else the order issued by the Central Service VI (Provision Service).

When the inspection of the ties in the yards of the station of Fossato di Vico, belonging to the Central Apennine Railway, is conceded, the supplying firm is bound to reimburse the State Railway Administration, in full, for all expense of handling and loading the crossties on the Administration's freight cars. However, the contractor always remains responsible for the number of ties inspected until every single lot has been completely dispatched.

Thus, whenever it is conceded to inspect and deposit the ties in the exterior yards of stations, the supplying firm will be held responsible for the additional expense which the Railway Administration must sustain for the handling and loading on freight cars, as compared with the ordinary expense incurred in depositing the ties in the inner yards of the station.

Besides this, a written statement should be delivered to the station chief, in which the supplying firm assumes full and entire responsibility for ties deposited in the outlying yards, for loss, breakage, etc.

The above-mentioned expenses will be deducted from the order of payment for the ties.

Whenever the Railway Administration in its exclusive judgment considers it necessary to suspend temporarily or limit the deposit of ties to be inspected, or to limit or suspend the inspection of the ties already deposited, the contractor will not have the right to appeal nor to demand indemnification of any sort.

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All expense incurred in removing the ties for inspection or for their assortment shall be met by the contractor.

The inspection will be made in quantities of not less than 400 pieces.

The requests for inspection should be directly and exclusively addressed by the contractor to the general management of Central Service XI (Maintenance) at Bologna. Requests sent to other services will not be considered.

The accepted ties will be dry-marked on both ends in the presence of the contractor or his representatives, with the mark $\frac{F.S.}{1}$

The inspection will be suspended when the number of ties to be discarded exceeds 25 per cent of the amount presented.

There must be present throughout every inspection, either the furnishing contractor in person or his representative, whose name will be given in the request for inspection.

After the inspection the accepted ties should be arranged carefully in piles under the charge and at the expense of the contractor at a station or depot and in a manner to be specified by agents of the Administration, or else, at the request of the Administration, when the loading can be made during the inspection, the ties should be piled up and loaded on freight cars at the expense of the contractor.

Ties that are rejected should be carried away from the station yards under the charge and at the expense of the contractor within 10 days of the completed inspection. When the contractor does not comply with this order, the Administration will apply to same, for all periods beyond the 10 days allowed, its rights as to goods in deposit or storage, determined by the tariffs and conditions in force for transportation.

At the expiration of three months from the date of inspection, the ties not removed will be considered as definitely abandoned by the contractor, and the Railway Administration will become the absolute owner and may dispose of them as it deems most opportune, without need of other notice given to the contractor.

It is absolutely forbidden to the contractor to perform any work of preparation of the ties in the station yards, either before or after the inspection.

It is within the power of the inspector to permit during the verification of the ties small alterations that may be considered necessary to render the ties acceptable.

The Administration will not be responsible for deficit in ties not yet inspected, or rejected, or held in deposit in the railway station, nor for accidental fires.

ART. 7. *Penalty for delay.*—Whenever the consignments are made after the dates specified, or when the rejected lots have not been replaced within the specified time, or when the substituted ties are again unacceptable, the supplying contractor will be subject to fine computed at the rate of 1 per cent of the value of the lots not consigned in time, for every full month of delay.

The fines will be liquidated and retained at the end of the furnishing of supplies, from the order of payment in settlement of same, and where this does not present sufficient margin, the difference will be taken from the security bond given as guaranty as in Art. 10.

Furthermore, when, on account of the contracting firm, the Administration does not have at its disposal the quantity of supplies of which it is in need at a given time, it will have the right to provide same, whatever may be the contract or economy involved, as it considers opportune, without need of public notice or judicial proceedings of any sort.

The lots acquired at the risk and augmented expense of the contracting firm shall be deducted from the total quantity included in the contract.

The Railway Administration will thus have the right in every case to indemnification for every expense and loss incurred in the complete or even partial failure to carry out the terms of the contract.

Any sum for which the contractor may be indebted to the Administration by the effect of the application of the present agreement will be withheld at the time of payment due the contractor for material furnished or for other reason.

Whenever the amount to be paid the contractor is insufficient, he will be notified to present himself at once to pay off his indebtedness. If he fails to do so, the Railway Administration will be deemed to have a claim on the deposit made by the contractor, as in Art. 8, without prejudice to any excess liability on his part when the security is not sufficient, and the Administration can also proceed according to Art. 458 of the Commerce Code of the Italian Kingdom.

ART. 8. *Security.*—As a guaranty for the exact fulfillment of the obligations assumed by the contractor by the present agreement, the Administration will retain one-twentieth of the amount of each bill and the sums resulting therefrom will remain intact in the Administration financial office.

For supplies exceeding 15,000 ties, the amount of the sums to be withheld from the contractor will be determined according to the value of the material furnished.

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The sum retained, one-twentieth of the amount, will be returned to the contractor only when he shall have exactly and completely consigned the ties contracted for, and after they have been received and checked up at the warehouse and after the settlement of all questions or misunderstandings, if any.

Before turning over the amount mentioned, it may be decided that the contractor deposit at the Deposit and Loan Bank an amount corresponding in value to the sum retained, in legal Italian securities, or revenues convertible from State to bearer, railway bonds, or other securities guaranteed by the State at the price quoted in the Stock Exchange the day before the deposit is made, every other sort of stocks or securities to be excluded.

No interest is due the contractor upon money or securities constituting the surety bond, except that yielded by the securities deposited with the Deposit and Loan Bank in conformity to its rules.

In order that such deposit may be effected, the contractor will receive from the Administration a letter certifying to his share in the contract, which letter should be exhibited at the bank named and by the bank at one of the official bureaus for the registration of the claim on the deposit. The receipt for the deposit should be turned over to the general management of the Railway Administration, Central Service VI, in Rome, within 10 days from the date of the granting of the contract for supplies.

Such receipt shall then be returned to the contractor in order that he may replace it with the final certificate, which must be turned over to said Service VI without delay, with copy of same, on unofficial paper.

The original certificate will then be returned to the contractor. The deposit will be redeemed when the contractor shall have exactly and completely consigned all the ties contracted for and after they have been received and checked up at the warehouse and all questions and misunderstandings, if any, have been cleared up.

ART. 9. *Interdiction of cessions.*—The contractor is absolutely debarred from making cessions or subleases for the accomplishment of the obligations assumed by the acceptance of the present agreement without the written authorization of the Railway Administration.

ART. 10. *Bills and payments.*—For every consignment the contractor should present to the inspector, in order that it may be cited in the official report, a detailed invoice, both the original and the copy, stating the following: The number of the ties, the marks, the price per unit, and the amount.

Payments will be made based on the number of ties recognized and accepted as a result of the official report of consignment, signed by the contractor or his legally authorized representative and the inspector.

Of the total number of the ties consigned, when not otherwise specified, nine-tenths will be paid on account, if possible, within the period of eight days from the date of report, if it was signed by the contractor or his legal representative at the time of compilation, or else the day following the date in which the inspector or inspector's office receives back the report, which has to be sent to the contractor for signature when the latter or his legal representative was not present at the inspection.

Of the remaining one-tenth, half will be paid to the contractor as soon as the administrative formalities incident to the complete liquidation of the amount due can be performed (as a rule, within 30 days from the date above specified), and the other half will be retained as a security deposit by the Administration in the sense of the preceding Art. 8, except in the case of the contractor's having effected the deposit with the Deposit and Loan Bank, as provided in said article.

In this case, instead of the nine-tenths on account, the contractor will be paid the entire amount of the bill. However, for differences incidental to a revision of the bill or from statements of the warehouse as to ties received, the Railway Administration may levy on successive payments due the firm, or in default of this, appropriate the surety bond.

Payments will be made in legal Italian securities in one of the following ways, selected by the Railway Administration: At the Bank of Italy, or the Railway Administration financial office, or at the stations of the Government railway, or by remitting bank securities.

ART. 11. *Legal domicile and representation.*—For all effects of this contract, the contractor must elect legal domicile in Rome with a person or house to be declared in his proposal. In default of this, the contractor will be understood as having domicile at the City Hall in Rome.

No one will be admitted as having the right of signing the contract as a representative of the contractor, unless presenting special and authentic power of attorney enabling him to accept explicitly all the clauses and conditions of the present agreement. The person, firm, or bank coming as delegated by the contractor to make collections in his behalf or in his interest must present special order for demanding payment and quittance in legal form.

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ART. 12. *Approval of the contract.*—The final contract, to be drawn up after the award has been made, will be binding on the contractor from the moment he signs but will not be binding on the Railway Administration until after it has received official approval in terms of the law. The contractor, however, is obliged to begin furnishing supplies whenever the Administration gives the order, pending the drawing up and approval of the contract.

ART. 13. *Expenses.*—All costs of contract, registration, and seals, and even acts of inspection, shall be borne by the contractor.

The following are the terms of agreement issued by the general management of the Italian State Railways for supplying beech ties to be taken from Italian forests (edition of 1909), in so far as these terms differ from those for red-oak ties. Articles 6 to 13 are practically the same as for red-oak ties and are therefore omitted.

ART. 1. *Object of the agreement.*—The present agreement has for its object the determination of the clauses and conditions for the furnishing of beech ties for laying permanent railways, as required by the State.

ART. 2. *Quality and source of the timber.*—The ties to be furnished shall be of beech (*Fagus sylvatica*), taken from woodland regions of Italy.

They should be taken from live timber, of standard size, hard and compact fiber, perfectly sound, of the best quality, and cut not more than six months.

Furthermore, they should be free from bark, decay, dote, dry rot, wormholes, excessive knots, rust, twisted fibers, frost shakes, brashy structure, splits; in short, free from any defect detracting from their durability and resistance, and especially free from putrefaction and red and gray caries.

The acceptance of crossties will be allowed that present a zone of red heart, provided such zone be not greater than half of the cross section and the red heart be completely sound and free from defects.

Ties, straight or curved, will not be accepted if they are taken from trunks having a warped fiber and cut obliquely, nor crossties having a crack even at one extremity only.

The contracting agent in his proposal, or in any event, within 15 days before beginning to cut the trees, should indicate the locality where the trees are found from which the ties are to be taken, the Administration reserving the right to have them looked over by its own agent, who will also have the right to inspect the line of work and make all the investigation necessary in order to be assured that so far as the quality of the wood and its preparation are concerned, the contractor carries out the conditions of the present agreement.

ART. 3. *Form and preparation of the ties.*—The ties shall be rectangular in section, of prismatic form, and straight and squared. Therefore they will have, as a rule, even surfaces and sharp edges, aside from exceptions allowed in Art. 5.

The large upper and lower faces and the ends should be sawed, except tolerances consented to in said Art. 5.

The other two faces may be hewn with the ax. Furthermore, the ends should conform to the longitudinal axis of the ties.

ART. 4. *Dimensions.*—The ties, in order to be accepted, should have, aside from exceptions stated in Art. 5, the following minimum dimensions: Length, 2.60 meters; width, 0.24 meter; thickness, 0.14 meter. The dimensions should be verified at the time the ties are received and for this reason the contractor, at the time of preparing the ties, should allow for natural shrinkage.

The price of the ties being fixed according to number and not by cubic measure, no credit will be given the contractor for quantity of timber in excess of the volume resulting from the standard dimensions specified.

ART. 5. *Allowances.*—(*a*) Dimensions: In receiving the ties one of the following minimum dimensions will be allowed: Length, 2.51 meters; width, 0.23 meter; thickness, 0.135 meter—always provided that the other two dimensions correspond with standard dimensions given.

The number of ties deficient even in a single dimension must not exceed 20 per cent of the total number accepted.

Reduced dimensions of width or thickness can be allowed only for ties that have about six months of seasoning.

(*b*) Wane: For the edges of the lower surface of the ties, no wane will be allowed; for the edges of the upper surface, wane will be allowed, provided the surface of the level portion of the face be not less than 16 centimeters.

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(c) Curves: The lateral faces of the ties must be straight so far as possible; however, a horizontal curve will be admitted, provided that the versed sine of the arc be not greater than 10 centimeters; but these ties must not exceed 10 per cent of the total number of ties accepted.

(d) Evenness of surface: Ties, which, in addition to the two sides, have the upper and lower surfaces hewn with the ax, may be accepted provided they are, in the judgment of the inspector, sufficiently straight and regular.

Ties may also be accepted whose extremities are only partly even, provided that the even part presents a surface not less than that of a rectangle of 16 by 10 centimeters.

WOOD-BLOCK PAVING.

Wood-block paving is not used in Italian cities to the extent that it has been in London, Paris, Berlin, Brussels, or even in the larger cities in the United States. The principal reason for the lack of introduction of wood as paving material is the availability of stone, which is the principal material used in the city streets. On the Via Roma in Turin, wood-block paving of southern yellow pine has been successfully used, and in Milan a variety of species, particularly maritime pine from France, have been tried out. However, wood-block paving has scarcely passed the experimental stage in Italy. Municipal engineers speak enthusiastically of it, however, and it can probably be introduced successfully.

In most of the Italian cities the paving facilities, ever since the outbreak of the war, have been neglected owing to the high cost of both labor and paving materials. Highway engineers are therefore looking forward to large reconstruction operations in most of the important municipalities, and wood blocks will come in for a fair share of importance for the resurfacing of the streets, many of which are at present in a most deplorable condition. Especially will this be true of the larger cities and the more progressive ones, such as Rome, Milan, Turin, Genoa, and Florence, and to a lesser extent in Naples, Palermo, Bologna, Padua, Verona, etc. Most of the southern cities, however, are already rather strongly committed to the use of large rectangular blocks of rock cut from the volcanic lava flows, approximately 12 by 16 inches on the face side, and laid in diagonal fashion across the streets. It is a cheap and lasting, though rather rough, form of pavement but difficult to keep clean and very wearing on all kinds of vehicles. It is the same kind that the Romans used 2,000 years ago and that one may see in ancient Pompeii to-day.

Rome has had an interesting history in street paving. Wood blocks were first introduced here about 30 years ago and at first did not meet with approval because of inferior methods of laying them and insufficient foundation. The engineers, however, have overcome the difficulties formerly encountered and are disposed to the use of wood blocks in the replacement work after the war. They are especially desirous of using wood blocks on the better avenues and boulevards and on all streets with trolley tracks. There are now 10,000 square meters of wood-block paving giving excellent service in the streets of Rome, especially on such main streets as the Via Nazionale and the Via Condotti.

About 13 years ago the city of Buenos Aires, Argentina, presented to the City of Rome a block of paving on the Piazza del Pantheon, composed of a Brazilian wood called algarroba. However, this and the native Italian beech and oak have been tried without success,

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owing to the fact that the surface becomes too smooth and slippery, particularly in wet weather. The wood that has given the best results to date has been the maritime pine from the Landes region of southwestern France. This was laid down by French engineers, and the Italian officials speak of it in the highest terms. However, they appreciate that the war has practically wiped out the forest resources of the famous Landes region and that it will be practically necessary to bring this material from America. Certainly Austria, the mainstay of Italy's lumber needs before the war, has no wood available for paving, as Austrian spruce is too soft and the only other Austrian woods, beech and oak, are unsatisfactory for this purpose. There is no native timber in Italy available for paving.

The blocks of maritime pine from France were 18.5 by 10 by 7.75 centimeters. Those from Brazil were 10 by 5.75 by 14 centimeters, while the native oak and beech were cut 15 by 10 by 3 centimeters. Probably the best way to introduce American lumber for wood-block paving would be to send it over to Italy in the form of heavy planking thick enough for the width of the block. Then it could be cut up in Italy into the desired sizes according to the metric measure, which, of course, is used in all operations of this kind. This would also save handling charges. Lumber is already sent to the paving-block plants in the United States in this fashion, so that this procedure would not entail any departure in the methods of American lumber manufacturers.

Maritime-pine paving prior to the war cost around $5 per square meter, laid down complete, including all costs. Stone paving with stone blocks 10 centimeters square and 20 centimeters high is less expensive, and consequently one finds it in common use throughout the Italian cities; but wood has such an advantage in being noiseless, sanitary, permanent, smooth, etc., that it is sure to be introduced on a more comprehensive scale after the war.

The following shows the specifications for improving certain streets, tracts, or zones of streets in the City of Rome by laying pavements of impregnated wood:

ART. 1. *Object.*—The present contract has for its object the execution of works and furnishing of supplies necessary in the transforming, by means of laying an impregnated-wood pavement, of the present roadways of the following streets of the City of Rome: Via del Babuino, Via due Macelli.

ART. 2. *Substance of the agreement.*—The extent of the pavement to be transformed is estimated at 5,860 square meters and the cost of the work, as outlined in this contract, is computed at 164,000 lire, unless there be a more exact appraisal when the work is completed.

ART. 3. *Subsidiary works.*—The removal of the present pavements, with all attendant operations, and the transportation of materials resulting therefrom to the city storage magazine at Testaccio or to any other locality that may be indicated by the city technical department, and all excavations and removals necessary to give the ground the even form that will be prescribed and the immediate transportation to the public dumps of earth remaining after the installation of the system, shall be performed by the contractor on the conditions and at the prices of the general contract that regulates work and furnishing of supplies for the City of Rome, as approved by the City Council of Rome by the vote of July 30, 1909, No. 323, and by the Royal Prefecture of Rome, by visé No. 60299 of October 7, 1909, with a discount of 10 per cent on the prices there indicated.

ART. 4. *Wood pavement.*—The wood paving properly so called consists of the following operations:

(1) Construction of a layer of concrete not less than 0.14 meter in thickness, which shall extend over all the width of the zone to be paved; and whenever the city technical office shall demand that the thickness of said concrete should be increased, in

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whatever place deemed necessary, the contractor will be paid an extra price of 0.35 lira per square meter for every added centimeter of thickness beyond that of the 14 centimeters prescribed.

The concrete shall be composed of 250 kilos of Portland cement of first-quality slow setting, for every cubic meter of large and small stones or rubble and half cubic meter of sand.

The mixing of the concrete shall be performed by means of suitable measuring apparatus under the inspection of the city technical office.

(2) Over this concrete the contractor must lay a coating of mortar 1 centimeter in thickness, composed of 400 kilos of Portland cement in proportion to 1 cubic meter of sand.

(3) Upon the foundation thus prepared and sufficiently dried the contractor must lay a paving of impregnated-pine wood blocks 0.10 meter in thickness.

The blocks should arrive at the workyards ready for use.

The pavement shall be constructed in regular rows regularly arranged along the road axis, the joints of every row alternating with the joints of the successive row.

The blocks shall be laid in contact and the interstices filled with mortar consisting of 500 kilos of third-quality slow-setting Portland cement for each cubic meter of sand.

At the crossings the rows shall be arranged according to the instructions of the city technical office.

After the blocks are laid all the joints should be carefully smoothed with said mortar cement. However, along the curbs of the streets and at the intersection with other paving systems an opening may be left for a time to allow for the expansion of the wood, which shall be inspected in the near future.

Lastly, over this pavement the contractor may superimpose at his own expense a layer of very fine gravel or rubble, which shall be swept away at the care and expense of the city as soon as it may be considered advisable by the technical office.

The work shall be carried on with the greatest speed and accuracy, in such a manner as not to interrupt the traffic.

ART. 5. *Tramways.*—The work of setting in order the equipment of the tramway system, which will be rendered necessary in consequence of modifications in the paving systems, shall devolve upon the company in possession of the street-railway franchise.

ART. 6. *Price and extra price.*—The contractor engages himself to execute all work of laying a wood pavement as in Art. 3 or any other work required to put a wood pavement in perfect condition at the price of 23 lire per square meter.

For streets served by tramway an extra compensation of 1 lira per square meter will be allowed, limited, however, to the space inclosed between the inside edges of the rails of the track.

For lines having a double track such extra compensation will be applicable to said space between the rails and to the intervening space as well, but at a rate not to exceed 1.40 lire per running meter of track if the intervening width is more than 1.40 meters. The track surface will not be deducted from the general calculation of the surface of the street; the same holds true of the surface of the special parts made of cast iron or broken stone in connection with the blades and frogs of switches and crossings.

In the conjunction of two parallel tracks the extra price of 1 lira shall apply to the surface between the rails of the connecting line besides that of the main track, a deduction being made for the space already accounted for as intertrack space.

ART. 7. *Time and penalties.*—The contractor engages himself to sign the contract within 8 days of the proposal, to begin work not more than one month after the signing of the contract, and to terminate it within 150 days from the signing of the same, except in cases of *force majeure* or where political conditions create serious difficulties as to the arrival of raw materials, or the organization of the workmen, or constrain the Government to requisition the materials gathered by the company for the execution of the work.

For each day of delay in the completion beyond the date prescribed the contractor shall pay a fine of 50 lire, which shall be deducted from the amount due the said contractor.

ART. 8. *Inspection.*—The city administration will make a preliminary inspection of each street within a month of its completion. The final inspection will be made one year after the last preliminary inspection.

ART. 9. *Maintenance.*—Until the time of the final inspection the contractor must, at his own cost, make all repairs necessary and turn over the paving work in perfect condition.

Therefore blocks that are rotted, split, or hollowed from whatever cause must be replaced immediately; holes, even of slight importance, and projections formed at

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the intersection with street-railway tracks and with other paving systems must be repaired at once.

If the contractor does not proceed to carry out the repairs ordered by the city technical office within 5 days from the date of the order, they will be made at the expense and risk of the contractor, regardless of the cost of the work itself.

For such expenditures the administration will reimburse itself from the security fund and any other credits of the contractor.

ART. 10. *Excavations.*—Until the date of the official report of the final inspection the reconstruction of the paving connecting with the underground work made by the city administration, by other public administrations, by public-utility companies, or by private persons by permission of city officials, shall be executed at the price of 16 lire per square meter for a zone of 20 cubic meters around the excavation and inside same and at 8 lire per square meter for the remaining surface of the excavation comprised within said zone.

Said price includes the perfect ramming of the excavation, the reconstruction of the concrete roadbed, the coating, and every other operation necessary to restore the paving to perfect condition.

Account will be taken only of the surface, ascertained at the time of tamping the excavation.

For payment for such work the contractor must apply to the administrations, companies, and private persons in whose interests the excavations were made.

ART. 11. *Payments.*—Payment for the paving that is the object of this agreement (Via due Macelli and Via del Babuino) will be made in installments of 30,000 lire, except the final payment of the balance.

At each payment 10 per cent of the amount will be retained as a guaranty for satisfactory performance of the work.

The sum of the amounts withheld will be paid to the contractor, less the amount due for liquidating indebtedness to the city, after approval by the final inspection on the part of the council.

ART. 12. *Opening of the streets by sections.*—As soon as the various sections of the streets to be remodeled shall be paved in wood, the administration can give transit through the same at the earliest possible time, but this action shall not imply performance of the contract nor constitute acceptance on the part of the city administration of the paved zone. The performance and acceptance can be a fact only after the final inspection, as stated in Art. 8.

ART. 13. *Validity of essential points.*—As far as is not explicitly stated or contradicted in the present agreement, the contracting firm will be bound by all the provisions of the general contract, previously cited, which regulates the work and the furnishing of supplies on behalf of the commune of Rome.

ART. 14. *Security.*—The contractor shall give as a guaranty a surety bond to the city treasury of 16,400 lire in securities or stocks acceptable to the city administration. Such security will be returned to the contractor after the approval of the final inspection by the city council, a deduction being made for what the contractor may owe the city.

ART. 15. *Domicile.*—For the purposes of this contract and for the execution of the work of construction and for the entire period of the maintenance of the pavement which is the object of this contract, the contractor shall elect domicile in Rome by a declaration in the contract.

ROOFING AND ITS SUPPORT.

In striking contrast to conditions in the United States, one seldom finds wooden shingles in the countries of western and southern Europe. In the case of dwellings in the smaller cities and in the country the wooden shingle was abandoned centuries ago, owing to the scarcity of wood and the general commitment to the use of tiling, which is reported to have been used since the days of the Roman Empire. It is said that on a few mountain homes in the Alps roughly spread wooden shingles are used, but they are the great exception to the general rule, and no shingles have ever been imported into Italy, according to the best information received from lumber agents, importers, etc. It is believed that a market could not be developed very easily for wooden shingles. The consensus of opinion among local lumbermen seemed to be that workers are entirely unfamiliar

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with the methods of laying shingles. They would appear to the people not so permanent as tiling, and the fire danger looms large, especially with the wholly inadequate fire-fighting facilities in Italy.

However, roofs in Italy require much more wood for their support than is the case in American frame dwellings, because the form of tiling used in Italy for roofing is so heavy that strong rafters and crossbeams must be placed very close together. It is estimated that one-third to two-thirds more wood is required to support the tiling used in Italy than to support the much lighter wooden shingles. There are no standard-sized rafters and distances apart, owing to the many different shapes and sizes of the roofs themselves, as well as different styles, kinds, and weights of tiling. In the discussion of general construction is given the size of rafters used to support the tiling. In some of the older Italian homes and buildings even round rafters have been used. In the more modern structures southern yellow pine is used for the better-class buildings, and Austrian spruce, Italian fir, and local pine for the smaller and cheaper structures. The tiling is usually in flat or half-round forms, shaped to set on top of one another, as in the case of shingles, and they are ¼ to ¾ of an inch or more in thickness. These red tiles, which are a distinctive feature of every Italian community, are placed directly on small crossbeams and poles, which are supported in turn by heavier rafters running from the eave to the drain at the base of the roof.

AGRICULTURAL USES.

Lumber is not used on individual farms and in agricultural communities to the extent to which it is used on American farms and in American communities. The home and barns to house the animals and farm machinery are built together in one structure, and the people generally live in rather primitive fashion. This home is usually built of stone, concrete, plaster, or brick, and very little wood is used in its construction. One finds no silos, wooden tanks, frame sheds or barns, chicken and hog pens, etc., which demand considerable lumber in the rural sections of the United States. The chief use for lumber and wooden products on the farms is for wooden containers in which to ship farm products and for agricultural machinery, farm tools, and vehicles. In contrast to conditions in the United States, the farm woodlot is seldom seen. The only fuel used is charcoal, which is brought on donkey back from the higher mountain regions, where it is produced from young peatwood sprout forests.

It is not likely that the demand for lumber for agricultural purposes in Italy can be increased and cultivated to an appreciable extent in the future, because of the unwillingness of the farmers, who are generally poor, to undertake the expense incident to the purchase of lumber, which is high in price. Many of the farmers are tenants of large landowners, who show little interest in the improvement of conditions under which their tenants operate the farms.

Owing to the great lack of agricultural implements during the war throughout Italy, there will be a very heavy demand for both imported and domestic implements. Certain quantities of hardwoods will be required for this purpose.

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POLES AND PILING.

Wooden poles are used for general purposes in the same way as they are in the United States; that is, one finds them along the principal highways and railroad systems. There is not the tendency to use substitute material for wooden poles that one finds in this country. In fact, one finds only steel and occasionally concrete poles in use on the high-pressure and other conduit poles used in transmitting electrical power from the Alps and Apennine Mountains in northern Italy.

The poles in common use are not so tall nor so straight as those common under American conditions. The native timber supply is used to furnish most of the poles; up to the present time practically no poles have been imported. After the war, however, a considerable number of poles will probably have to be imported, owing to the exhaustion of the native supply and the necessity of renewing the pole lines throughout the country. Whether the street-railway systems, trolley companies, and other purchasers will resort to the steel, concrete, and other substitute poles will depend in a large measure upon the prices at which the timber poles can be obtained from other countries.

Estimates obtained from the most reliable source, such as the companies mentioned and companies dealing in poles, indicate that the annual consumption of poles throughout Italy prior to the war was 100,000 to 150,000 per annum. After the war it is likely that the consumption for the first few years will be 150,000 to 200,000 at least.

The timber that was relied upon to furnish this material was largely chestnut and local pine, probably 80 per cent of the total being chestnut. The chestnut was used without any preservative or other artificial treatment to prolong its life in the ground, but the pine poles were charred from the butt up to a point about 5 to 10 inches above the ground level. The classification of poles was largely by lengths and they were generally purchased on that basis as well. The following table shows the lengths and circumferences at 2 meters from the base and at the top of the various classes of poles:

Classes.	Lengths.	Circumference—	
		At 2 meters from base.	At top.
	Meters.	*Centimeters.*	*Centimeters.*
1	6.50–6.99	50	30
2	7.00–7.49	50	30
3	7.50–7.99	56	32
4	8.00–8.49	56	32
5	8.50–8.99	60	36

These poles cost 5 to 12 lire each or, roughly, $1 to $2.40, depending upon the length and to some extent upon the circumference and general quality and straightness of the poles. This cost is figured on the basis of a delivered price at a railroad station convenient to the point of production. In comparison with these pre-war prices, the cost rose rapidly following the opening of hostilities until in the summer of 1918, the price was 12 to 50 lire ($1.62 to $6.75, at 13.5 cents to the

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lira), delivered under the above conditions. It is not likely that the latter price will obtain for a long period, but the price depends upon the urgency of the demand and the supply brought in to stock the market.

Poles are placed in Italy about 80 meters apart. It is estimated that the life of the chestnut pole is 8 to 11 years, while that of the charred-pine pole is 6 to 10 years.

Very little piling is used in Italy and it is not likely that there will be a demand for piling after the war on account of the limitation of its use. Almost all the material used is oak. The oak is very similar to the American white oak, and there are two species for this purpose. Some of the so-called "cerro," or red oak, is used for piling, but it is resorted to only when the local white oak is not available or is too high in price. The only example of the extensive use of piling is in Venice and a few smaller cities in the lagoons, along the northern coast of the Adriatic Sea. Most of the docks, piers, and wharves are constructed of heavy blocks of stone or of concrete.

The total length of the Italian telegraph lines in 1915 was 33,561 miles and that of the telephone lines, 24,620 miles. There are no figures available showing the length of line or number of poles used for electric power transmission and for street-car lines.

LUMBER STORAGE AND SEASONING.

It may safely be stated that lumber receives much better attention in Italy between the time it is imported or manufactured locally and the time of its ultimate use than it does in this country. Storage facilities are usually provided in sheds to protect it from the drying effects of the long Italian summers. Lumber is seldom piled in the open, as in the United States. Baltic and Austrian lumber is always piled without the use of sticker strips, whereas American lumber is sometimes received in such condition that it must be given extra care in order to complete its normal seasoning processes.

Austrian spruce and Austrian and local silver fir are rather susceptible to checking under the influence of the hot, dry climate, particularly in the south of Italy and in Sicily, where the climate is similar to that of northern Africa. Dry kilns are found only in connection with furniture, cabinet, and airplane factories. They are never used in connection with lumber-manufacturing plants in Italy, and practically none of the lumber imported from either Austria or the Baltic regions has been kiln-dried. Lumber, however, from those countries has been seasoned for four to eight months (usually five to six months) before being shipped, so that it usually arrives in excellent condition and can be piled in the open-air sheds without danger of serious checking. This is especially true of the Baltic pine. Little Baltic spruce comes to Italy.

End piling is used to a considerable extent in Italian lumber yards, and end piling with sticker strips between the boards is frequently resorted to in order to season lumber freshly cut. In lumber mills, especially, is this true in connection with special stock designed for airplane, furniture, and car construction, and for other purposes that require wood carefully seasoned. Green lumber, unless seasoned slowly and under cover, will often check in the summer time. A great

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advantage that southern yellow pine has over Austrian spruce is that it is less likely to check and crack under the influence of the hot, dry climate. American hardwoods have generally come to Italy well-seasoned. There has been little, if any, complaint regarding the condition of American white oak and red gum, or of other hardwoods from this country.

WOOD PRESERVATION.

Wood preservation has not reached the importance in Italy that it has attained in the United States or in some of the other European countries. Generally speaking, timbers are not treated to increase their life. Owing to the dry climate, wood is not so susceptible to decay as it is under such conditions as prevail, for example, in England. The preservative treatment of railway crossties has received a great deal of attention, however, and has probably attained an importance even greater than that in the United States.

Approximately 65 per cent of all ties used heretofore have been treated, the remaining 35 per cent being of white oak, which requires no treatment. Approximately two-thirds of all the treated ties are beech of both Italian and Austrian origin, the remainder being largely produced from local red oak, or "cerro," and from Italian pine, elm, and eucalyptus. Italy will require large quantities of imported ties after the war. White-oak ties may be imported untreated, but treated red-oak and beech ties are desired. It is likely that between 4,000,000 and 6,000,000 ties will be required annually after the war.

There are four important crosstie-treating plants in Italy—Naples, Rome, Milan, and Mestre. They are all private plants, but during the war all have been militarized. Owing to the difficulty of obtaining creosote oil, these plants have been compelled to resort to zinc chloride during the war. All ties are placed in the track 85 centimeters apart, center to center. The approximate cost for the Rueping process using creosote oil was as follows before the war: White oak, 1.75 lire (34 cents); red oak, 2.10 lire (41 cents); beech, 1.90 lire (37 cents). There are no figures for Italian pine, elm, and eucalyptus, as these woods are not treated by the Rueping process.

The cost per tie of treating ties of different woods with zinc chloride during the war was as follows, according to the statement of one plant: White oak, 2.85 lire; red oak, 2.25 lire; beech, 3.20 lire; Italian pine, 2.15 lire; eucalyptus, 2.10 lire; elm, 2.25 lire.[a] Only those white-oak ties that contained sapwood were treated.

The durability of beech crossties is estimated to be increased from 2 to 4 years without treatment to 30 years when creosote oil is injected by the Rueping process, and to 12 years when zinc-chloride solution is used. Prior to the war, pine, elm, and eucalyptus were used very little, and no records are available to show the results of the two processes. The following amounts of creosote oil and of zinc chloride, respectively, are used for each tie of different kinds of wood: Red oak, 8.75 kilos of creosote oil and 16 kilos of zinc chloride; beech, 11 kilos of creosote oil and 30 kilos of zinc chloride; pine, 6 kilos of creosote oil and 12 kilos of zinc chloride; elm, 8.25 kilos of creosote oil and 16 kilos of zinc chloride; eucalyptus, 8 kilos of zinc chloride.

[a] The average exchange rates of the lira for the war years were as follows: 1914—19.3 cents; 1915—16.5 cents; 1916—15.2 cents; 1917—13.3 cents; 1918—13.5 cents.

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At one of the largest Italian crosstie-treating plants the annual capacity was about 1,000,000 ties per annum, or about 4,000 per 8-hour shift. There have been two working cylinders, 21.50 meters by 2.10 meters in inside diameter. These cylinders take an average of 350 to 400 ties each. Each contains 8 trucks of 42 to 50 ties per truck. This plant used the Rueping process entirely before the war, but with the supply of creosote cut off from Germany and Belgium it resorted to zinc chloride.

The following is a translation of a memorandum furnished by the director general of the Italian State railways regarding the supply of railway ties from abroad and information regarding the treatment of ties used by the Railway Administration:

During this year about 1,000,000 ties may be purchased in foreign countries. The ties may be white oak (rovere), red oak (cerro), or beech.

Ties of white oak fulfilling the conditions of our contract for the purchase of such ties abroad may be accepted even though not treated with any preservatives. On the other hand, ties of red oak or beech should be delivered impregnated with creosote oil.

At present, owing to a lack of creosote oil, our ties are impregnated with a solution of chloride of zinc, but this process has been adopted only temporarily, for the duration of the war, for it is intended to employ creosote oil as soon as possible, as it is the best wood preservative.

After the closing of the factories of the Società Conservazione Legno (Wood Preservation Co.), which had been taken over by the Ministry of Munitions to obtain tar intermediates for the manufacture of explosives, the treatment of our ties was intrusted to the Società Rueping exclusively. The method of impregnating ties with creosote oil by the Rueping system, the quality of preservatives, and the quantity to be absorbed by the ties are described in the annexed sheet.

Under the Giussani system beech ties were treated with a double cold bath of creosote oil and a solution of zinc chloride, preceded by a warm bath in a liquid having a boiling point of not less than 145° centigrade (293° F.) and absolutely harmless to the wood, to the substances composing the cold baths, and to the iron fixtures. The duration of the warm bath should be such as to effect an absorption, in the cold bath, of at least 8 kilos of creosote oil and 15 kilos of the solution of zinc chloride.

The treatment of ties of white or red oak under the Giussani system consisted of only one cold bath of creosote oil, preceded by a warm bath, as indicated above, and the minimum quantity required to be absorbed in the cold bath was 4 kilos of creosote oil for each tie of white oak and 7 kilos for each tie of red oak.

The rules concerning the cold-bath preservatives were, as regards creosote oil, about the same as those described in the annexed sheet for the Rueping system. The solution of zinc chloride was to have a density of 3° Baumé at a temperature of 15° centigrade (59° F.), was to be absolutely clear of free acids, and was not to contain heterogeneous substances in quantity exceeding 3 per cent of the zinc chloride considered as anhydrous.

The following shows the specifications for the impregnation of ties with creosote oil by the Rueping system:

The impregnation of ties will be undertaken only when they are sufficiently seasoned, so as to permit the absorption of creosote oil, as hereinafter indicated:

(*a*) *Ties of white oak with sap and of red oak.*—When the ties have been placed in the impregnation cylinder a depression of about 60 centimeters of mercury should be made; then, after the cylinder has been filled with creosote oil, pressure not exceeding 12 atmospheres should be applied.

The duration of the depression and of the succeeding pressure will be regulated by the contracting company, according to the condition of the pieces to be treated, in a manner to obtain the prescribed results.

The temperature of the creosote oil must be maintained between 75° and 90° centigrade. When the period of oil absorption has terminated, a depression of about 60 centimeters of mercury shall be made in the cylinder for not less than 15 minutes. When atmospheric pressure has been reestablished in the cylinder, the ties shall be taken out.

(*b*) *Ties of beech.*—After the ties have been placed in the impregnation cylinder a compression of air, of 4 atmospheres at most, shall be made in the cylinder. Then, after the cylinder has been filled with creosote oil, having a temperature of 50° to

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95° centigrade, the pressure achieved being maintained all the time, the oil introduced shall be subjected to a pressure which the company will judge sufficient for impregnating the ties with the prescribed quantity of oil.

When the period of absorption has terminated, the cylinder will be emptied of the oil therein contained and a depression of about 60 centimeters of mercury shall be produced, maintaining such rarefaction for a time considered sufficient by the company. Finally the atmospheric pressure shall be reestablished in the cylinder and the ties shall be taken out.

The impregnation of ties of white oak, red oak, and beech must be made, as a rule, separately for each quality of material.

The ties should be weighed before and after the impregnation. The increase in the average weight must be 4.75 kilos for each normal white oak tie; 8.25 kilos for each normal red oak tie; 11 kilos for each normal beech tie.

The increase in the weight of the ties must be verified for each small wagon load.

A tolerance will be granted of 15 per cent, more or less, on the increase of the prescribed average weight.

Whenever the increase of weight shall be less than the minimum prescribed, the ties may be subjected to a new impregnation, which may be made when it has been ascertained that the minimum increase of weight has not been reached or when it it may be judged, from the progress of the operation, that such minimum will not be reached—that is, without taking the pieces out of the cylinder after the depression on that marks the end of such operation.

When, even after the second injection, the ties to be impregnated shall not have reached the increase of weight prescribed by the contract, they may be treated again after a period of time sufficient for their seasoning, not less than 20 days.

In the reimpregnations the ties must be placed in the cylinders united in the same groups in which they were impregnated the first time, so that the weight of each group as determined can be compared with the weight of the group in its natural state, and they shall be accepted when the sum of the increases of weight ascertained at each successive injection shall reach or surpass the average increase prescribed by the contract.

When ties have been reimpregnated after a period of seasoning, the report shall state the increase of weight corresponding to such sum diminished by 15 per cent to account for the loss of oil during the period of seasoning.

At the end of the work the aggregate increases shall be determined separately for the ties of white oak, red oak, and beech.

The eventual differences between the verified increases and the prescribed averages shall be debited or credited to the contractor up to the maximum of 15 per cent, in proportion to the price for each kilo (2.2 pounds) of creosote oil.

Ties that, after impregnation, show cracks or any other alterations, which make their use impossible or precarious, shall be considered as not impregnated.

The Railroad Administration may make any tests that may be held advisable, including the sawing of the impregnated pieces to verify the penetration of creosote oil, the testing of the tensile strength of pieces treated and pieces not treated, and the testing of the thermometers used for the impregnation cylinders and in the distillation of creosote oil.

The said test of the thermometers must be made at a public office designated for the purpose under arrangements with the Bureau of Works of the State Railways.

The expenses for such tests, including the impregnation for the test as aforesaid, shall be paid by the contracting company.

The creosote oil must be so composed that on distillation at a temperature up to 150° centigrade it should volatilize at the maximum to an amount of 5 per cent; up to 200°, to 10 per cent; and up to 235°, to 25 per cent, almost.

The temperature of distillation should be ascertained by the means of a thermometer, the bulb of which should be immersed only in the steam developed during the distillation.

The creosote oil at 15° centigrade must have a specific weight between 1.04 and 1.10; at 40° centigrade it must be perfectly limpid, and its mixture with an equal volume of crystallizable benzol must remain limpid showing, at most, traces of undissolved particles.

Two drops of this mixture, or of creosote oil alone, dropped on filter paper, many times doubled, must become completely absorbed, leaving, at most, traces of dissolved particles, but not a distinct spot.

The oil must contain at least 6 per cent of acid parts (carbolic acid or homologous acids); that is to say, of parts soluble in soda lye, for the specific weight of 1.15 at the temperature of 15° centigrade.

The Administration of the State Railways shall have the right to examine at any time the creosote oil employed.

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EXAMPLES OF DURABILITY OF WOOD.

Probably better examples of the long-continued use and durability of wood in various forms and placements are to be found in Italy than in any other country. Wood has been in constant use for many centuries in Italy and frequently shows very little effects of wear. Throughout the country, which is very old historically, one can find some excellent examples of durability. For example, in many old cathedrals and palaces, beams in the ancient cellars and attics, of various species—such as Italian oak, pine, chestnut, etc.—have been found to be still sound and firm after continued use for many centuries.

In the old Palazzo Vecchio, which was built in Florence about 1225, there are old pieces of furniture, cabinets, and doors of walnut that are still sound and show but little sign of decay. To support the large and heavy roof, there are large beams of silver fir and oak which have been in place since the original date of erection and are still sound and firm. Some of these beams are 16 by 16 inches in cross section and 70 feet in length, while many others are 12 by 12 inches, 10 by 20 inches, 10 by 15 inches, 10 by 16 inches, 8 by 16 inches, etc., and 30 to 70 feet in length. In the same place are life-sized figures of Dante and Petrarch, made of inlaid walnut in the year 1310, which are still sound and firm.

In the Palazzo Ferroni, where the American consulate is located in Florence, there are large old beams of oak, fir, and spruce, placed in the year 1490, which are said to be perfectly sound.

In the Sacristry of St. Marks, in Venice, are some of the best-known and most excellent examples of inlaid work to be seen anywhere. These depict scenes from the Bible and are very large and massive. They are made of native pine similar in general character to American white pine, and of Italian cherry and walnut. Another excellent example is a wood carving at the hermitage of San Eremo di Romualdo in Tuscany.

Practically all of Venice and the neighboring towns of the Adriatic lagoons are built on piling and it is said that many of the structures still remain on piling put down when Venice was first built. The Cathedral of St. Marks, for example, was begun in the year 600 and completed in about the year 1000, so that one can readily estimate the long period of service these pilings have given. The pilings are largely 8 to 18 meters in length and 20 to 30 centimeters in diameter at the top.

It is said that in the case of the famous old Campanile near the Cathedral of St. Marks, in Venice, the piling was gradually weakened by the excessive weight and finally gave away a few years ago. On the top of these pilings is placed the foundation of large blocks of stone.

Some of these pilings, nearly 2,000 years old, have been dug up and found to be still sound and firm. In some cases portions of these oak pilings have been made into famous articles of woodwork and command large prices. In some cases the wood has practically petrified into stone and has assumed a deep black color as a result of its long-continued use in the river or sea bottom or beneath the surface of the ground.

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AUSTRIAN COMPETITION.

Owing to the disturbed political conditions in Austria and in other countries supplying lumber to Italy, the question of competition in the future is of great importance. Looking to the immediate future, it is likely that the breaking up of the nations formerly composing the Austro-Hungarian monarchy will have a far-reaching effect on the lumber trade of Europe. Until the war of 1914 Austria-Hungary was one of the most important lumber-exporting nations of the world, being second only to Russia in the quantity and value of its lumber exports. Much of this country, particularly in Hungary, is composed of rather mountainous land somewhat removed from the larger communities and transportation facilities, and owing to the continuous protection and care of its forest resources this country not only has been able to supply its own requirements for wood products but has sent large quantities to foreign countries, particularly Germany. In 1913 the value of exports of all forms of forest products from Austria-Hungary was $68,541,000.

Recent authentic reports indicate that the former monarchy of Austria-Hungary will not continue to be so important a factor in the Italian lumber trade for the following reasons:

(1) The seriously disturbed political conditions are sure to have a far-reaching effect on the production and exportation of lumber from each of the individual nations that will develop from the former dual monarchy.

(2) Considerable quantities of the most valuable forests of Austria-Hungary (those in the Carpathians, particularly in the Provinces of Galicia, Bukowina, and Transylvania) have been destroyed or seriously damaged by successive advances and retreats of the Russian and Austrian armies through this area. Galicia is the most heavily forested Province in the monarchy, and this whole region contained some of the best stands of spruce available for export. It has been reported that nearly 4,000,000 acres of forest have been destroyed in Galicia alone.

(3) There will be a great domestic demand for lumber and all kinds of forest products following the war. Austria normally imports large quantities of lumber, and since this trade was cut off during the war and practically all building operations and wood-using industries stopped, the post-war requirements are sure to be very large.

(4) The lumber-manufacturing facilities, except those required to meet the demands of the war program, were almost completely deranged during the war. This factor, combined with the heavy domestic demand, is likely to have great significance for the future export lumber trade from Austria. Investigation has disclosed the fact that Austria has not stored up large quantities of lumber stock for export, as has been the case in some other countries.

(5) Transportation facilities both by land and by sea are impaired. The shipping facilities of the merchant marine have almost entirely disappeared. The railway rolling stock of Austria has been seriously depleted, and in many cases the railway tracks themselves will require complete rehabilitation before the railroads can resume full operation.

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(6) The stumpage values for lumber are high. It is estimated that the stumpage values, which were far in excess of those in this country even before the war, have risen 100 to 200 per cent or more since the war began in 1914. These high stumpage rates will doubtless decline in time, but for the first five years following the war the lumber exporters from Austria will be more or less embarrassed by high stumpage values, which, of course, mean high values for manufactured lumber.

(7) Labor is expensive. Wages have risen in Austria in almost the same proportion that they have in most of the European countries; that is, 200 to 400 per cent or more. Most of the Austrian lumber-manufacturing plants have depended upon a large amount of manual labor in the past because of its cheapness. After the war more labor-saving devices must be resorted to, for the cost of the product, owing to the labor charge, will of necessity be extremely high and may seriously embarrass the Austrian lumber manufacturers in attempting to place their product on the Italian markets at prices to compete with American or other lumber.

It has been pointed out earlier in this report that Austrian lumber has had the great advantage of cheap transportation to Italy. But Austria has no structural timber to offer in competition with southern yellow pine and Douglas fir, and of its hardwoods white oak is expensive and beech is limited in its uses. Baltic and Russian lumber have been unsuccessful in their attempts to enter the Italian market on a large scale.

FOREST CONDITIONS IN AUSTRIA-HUNGARY.

The forest area of the Austro-Hungarian monarchy before the war was 52,837,266 acres, or 30 per cent of the total area. This is the largest forest acreage of any country in Europe, except Russia; Sweden has only 49,390,325 acres and Germany only 34,989,675. Owing to the efforts of the Government forestry officials, who regulated the cutting not only of the State forests but also of some communal and provincial forests and those belonging to churches and other organizations, the forest was maintained in an excellent condition of productivity for 100 years, but for the last 10 years it has been somewhat overcut. The Austro-Hungarian forest is maintained in much better condition than that of Italy; the young forests are not allowed to be cut off so young for charcoal as in Italy, and careful attention is given to most of the forest areas, as is true also in the forests of Germany, Switzerland, and France. It is said that 47 per cent of the area of the forests in Austria is handled under systematic principles of forestry and that the results obtained have been most satisfactory. Some of the forests are even so remote and inaccessible that the logging and exploitation features are very similar to conditions in the United States. Although most of the European countries that handle their forests under scientific methods of management permit only the annual yield or growth to be cut, Austria-Hungary has been overcutting its forests within the last decade, and it is likely that with the creation of other nations from this territory strict measures will be promulgated to permit only the annual growth to be cut. This may have an important bearing upon the ability of these nations to engage in the export lumber trade to so large an extent as did the dual monarchy.

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The following table shows the areas of forest land, the acreage per capita, and the percentage of land area in forests in Austria, Hungary, Croatia and Slavonia, and Bosnia and Herzegovina. The figures for Austria refer to the year 1910 and those for Hungary to 1913; those for Croatia and Slavonia, the latest available, are for 1894.

Political divisions.	Forested area.		Percentage of total area.
	Total.	Per capita.	
	Acres.	*Acres.*	
Austria	24,138,000	0.85	32.5
Hungary	18,287,000	1.00	26.2
Croatia and Slavonia	3,782,000	1.44	36.0
Bosnia and Herzegovina	6,380,000	3.36	50.4
Austro-Hungarian Monarchy	52,587,000	1.03	31.5

AUSTRIA.

The most heavily forested Provinces in pre-war Austria are as follows: Galicia, 4,927,000 acres; Bohemia, 3,802,000 acres; Styria, 2,594,000 acres; Tyrol, 2,564,000 acres.

Contrary to the rule in many European countries, a large share of the Austrian forest land is privately owned, belonging not only to individuals, but to the entailed estates of the nobility, to religious, secular, and educational institutions, and to various public funds, charitable and benevolent societies, and other organizations. The following table shows the forest acreage and the percentage of the total forest area of Austria owned by the Government, by various organizations, local governments, etc., and by private individuals at the end of 1910:

Character of ownership.	Acreage in forests.	Percentage of total forest area.
Government	1,795,000	7.3
Communal and provincial	3,216,000	13.3
Entailed estates of nobility	2,608,000	10.8
Religious and educational institutions	817,000	3.4
Societies, churches, public funds, etc	1,801,000	7.6
Private	13,901,000	57.6
Total	24,138,000	100.0

Of the total area of forests in Austria 60.4 per cent are softwoods, 21.2 per cent are hardwoods, and 18.4 per cent are mixed forests. Most of the softwood, probably between 70 and 80 per cent, is spruce (*Picea excelsa*). The trees of this species grow larger in Austria than they do in Sweden and Finland, the principal sources of production in the Baltic group of countries. It is the principal wood imported into Italy, where it is sold on the markets as "abete" or "abete rossa." The remainder of the softwood is made up of pine (*Pinus sylvestris*), silver fir (*Abies pectinata*), and larch (*Larix europea*). There are a few other softwoods, but they are not of commercial importance. The spruce grows at the higher elevations along with

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the fir. The larch is found chiefly in the Tyrolean, the Julian, and the Carnic Alps. The pine grows on the lower elevations. None of these softwoods approaches in size the more important softwoods produced in the United States. It is seldom that widths of over 10 to 12 inches can be obtained, and most of the widths run from 6 to 9 inches. Occasionally spruce boards can be obtained up to 20 and 25 inches, but they are exceptional. Austrian spruce, however, produces much wider boards than Baltic spruce, which can seldom be obtained in widths of over 9 inches.

The production of Austrian hardwoods is relatively unimportant. A large proportion of the hardwood forest is beech (*Fagus sylvatica*), which resembles in appearance, as well as in weight, color, texture, seasoning qualities, etc., the beech found throughout the northeast and central hardwood belts of the United States. The hardwood forest of Austria, generally speaking, lies on the lower elevations, just below the softwood forests and above the rich agricultural districts. The beech is used largely for railway crossties, for fuel wood and charcoal, for furniture, particularly bentwood chairs, for boxes, and for tools, implement and vehicle stock, woodenware, flooring, and other purposes where a hard, heavy, tough wood such as beech may be used. In some portions of Austria the beech is so inaccessible that it is not considered worth cutting.

A small percentage, probably 25 to 30 per cent, of the hardwood forests in Austria is made up of white oak, which is of the same species as the Slavonian white oak (*Quercus pedunculata*) but does not produce a wood of such high quality. Most of the white oak produced in Austria is consumed locally; small amounts are sent to Germany. It is seldom exported to other portions of western Europe or to Italy. Other hardwoods produced and consumed locally, but not exported, are hornbeam, alder, birch, ash, and a few others, but none of these is of great commercial importance.

The mixed forests are made up largely of spruce, silver fir, and beech.

In some of the mountainous districts where there are drivable rivers the spruce is cut and floated to the nearest lumber mill, whereas the beech, on account of its nonfloatability, is left in the woods or is cut occasionally for local requirements such as fuel wood or charcoal.

The annual cut of Austria is estimated at 1,413,000,000 to 1,580,000,000 cubic feet of forest products of all kinds, including fuel wood.

HUNGARY.

The forests of Hungary are largely of hardwood. Hungarian and Slavonian white oaks have been famous in the European hardwood markets for over 100 years, and to-day the Slavonian white oak is considered the oak "par excellence" for the finest cabinet, furniture, and flooring purposes in the markets of western Europe.

There are about 28,500,000 acres of forests in Hungary, Slavonia and Croatia, and Bosnia and Herzegovina. Most of the hardwood growth is of beech and oak, with a great variety of miscellaneous hardwoods, such as birch, poplar, alder, willow, maple, elm, oak, locust, hornbeam, basswood, and a few others of minor significance. None of these hardwoods, except beech and oak, is ever exported.

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The softwood forests, which are limited to the higher elevations, are made up of spruce, silver fir, larch, and pine. They are of the varieties that were described as growing in Austria.

The ports and railway frontier stations from which the lumber of Hungary, as well as Austria, is shipped to Italy, are given under the heading "Transportation facilities."

The following table shows the acreage and the percentage of the total forest area under oak, beech and other hardwoods, and softwoods, in Hungary proper, Croatia and Slavonia, and the Kingdom of Hungary in 1913:

Species.	Hungary.		Croatia and Slavonia.		Kingdom of Hungary.	
	Acres.	*Per cent.*	*Acres.*	*Per cent.*	*Acres.*	*Per cent.*
Oak	4,852,600	26.5	831,300	22.0	5,683,900	25.8
Beech and other hardwoods	9,046,500	49.5	2,520,100	66.6	11,566,500	52.4
Softwoods	4,387,700	24.0	430,400	11.4	4,818,100	21.8
Total	18,286,800	100.0	3,781,800	100.0	22,068,500	100.0

The annual cut in Hungary is estimated at 30 to 33 cubic feet per acre on the State forests alone, but there are no accurate figures of production.

The exploitation of the forests of Bosnia and Herzegovina has been rather recent. These two Provinces alone produce annually about 7,487,000 cubic feet of softwood products, 1,413,000 cubic feet of oak, and 9,006,000 cubic feet of beech.

LUMBER MANUFACTURE IN AUSTRIA-HUNGARY.

According to the latest available figures, the yearly production all the forests of Austria-Hungary, including Bosnia and Herzegovina, was 2,827,000,000 cubic feet of wood, or 22,616,000,000 board feet, which is equivalent to about 54 cubic feet per acre. This total production, however, was about equally divided into firewood and lumber, the average price on the stump being 3½ cents per cubic foot, or $4.38 per 1,000 board feet for all classes of forest products, including fuel wood.

The manufacture of lumber and forest products generally is highly specialized in Austria. Most of the mills are small in comparison with those in the United States, although some have an output, including both night and day shifts, of around 800,000 board feet per day. There are probably only half a dozen mills in the whole country, however, that manufacture over 200,000 board feet in two shifts in a day.

On one of the largest lumber operations in Transylvania a combination of chutes is used to bring the logs down the steep mountain sides to an overhead cableway system, which carries the logs 30 kilometers (1 kilometer = 0.621 mile). At the end of the cableway system a railway of 27 kilometers carries the logs to the sawmill on one of the main railway systems.

Figures of lumber production, statistics of the number of sawmills, etc., have not been compiled for Austria-Hungary as accurately as they have in the United States. The most recent available figures for the number of sawmills are for 1900, when Austria-Hungary had

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13,489 sawmills, of which 912 were operated by steam and 12,577 by water. In Austria alone there were 11,868 sawmills, 253 wood-pulp mills, and 375 charcoal-manufacturing establishments.

Most of the lumber mills are operated with so-called gang-frame saws, which make from 2 to 8 or 10 cuts at once. There may be 4 to 8 or more of these gang saws operating in one sawmill. No head saws prepare the logs for the gang saw, as in the United States. The gang saws manufacture lumber much more slowly than American gang saws, but the kerf is comparatively small, and the lumber is almost always carefully and accurately sawed. The lumber is frequently edged by hand; when sawn it is carried over to a saw table, where a circular saw takes off the wane. In case of the best logs, particularly of Slavonian white oak, the separate boards from selected logs are kept together after sawing and sold "en boule" for matching purposes in cabinet and furniture work.

Most of the lumber is air-seasoned, the facilities for kiln drying not having reached the development that they have in the United States. Dry kilns are used only in connection with furniture and airplane factories.

In grading methods each Province, and often each mill, has its own rules, which have been followed in some cases for 100 years or more. Only recently has there been a tendency to formulate similar rules among several companies for a given kind of wood. In Hungary the spruce is usually graded into five different qualities. The following table shows these grades in order:

Grades.	Equivalent Italian names.	Literal translation.
Firsts	Bianco	White.
Seconds	Rossa	Red.
Thirds	Verde	Green.
Fourths	Bleu	Blue.
Fifths	Nero	Black.

The manufacturers use paint of the designated colors on the ends of the boards to denote the different qualities.

In Roumania and Bulgaria three qualities are commonly recognized in spruce for export: Firsts, seconds, and thirds.

In Hungary the lumber manufacturers generally regard the spruce (*Picea excelsa*) as being superior to silver fir (*Abies pectinata*), whereas in Italy spruce is less appreciated and fir more. Italian importers allow as high as 15 to 20 per cent of fir to be mixed with the spruce, whereas for local consumption in Hungary, Bulgaria, Roumania, and Serbia it is customary to permit only 5 per cent of silver fir.

For France, Germany, Turkey, Asia Minor, Egypt, Algeria, and the Mediterranean trade generally three grades are commonly recognized among the principal exporters of spruce in Austria: Firsts, seconds, and "tombante," the last being a mill-run grade. For the German market there are four grades: Firsts, seconds, "tombante," and Rotterdam. For the market of northern Italy the following grades are recognized by some of the most important manufacturers for spruce manufactured in Styria, Tyrol, and Carinthia: Netto, which is a clear grade or literally a superfirst grade; Prima, or firsts; Seconda, or seconds; and Terza, or thirds.

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For the markets of Genoa, Sardinia, Naples, and Sicily lumber products from the Black Sea region (Roumania, Galicia, and Transylvania) generally come in three grades:-First, second, and tombante. But the interpretation of these grades may differ with different mills or districts. The tombante grade corresponds to the "unsorted," or mill-run grade commonly sent from the Baltic countries to Spain and occasionally to Italy.

AUSTRIAN LUMBER TRADE.

Most of the wood exports of Austria-Hungary have been taken by Germany. Italy has received a relatively small though increasing quantity; and, in addition to the quantities shown in the statistics, Italy receives Austrian lumber that is reexported from Russia.

The following table shows the quantity and value of the total imports and exports of wood and wood manufactures entering into the trade of Austria-Hungary from 1909 to 1913. The metric quintal is equal to 220.46 pounds and the Austrian crown to 20.3 cents at the normal rate of exchange:

Articles and years.	Imports.		Exports.	
	Quintals.	*Crowns.*	*Quintals.*	*Crowns.*
Wood:				
1909	4,488,513	11,192,000	18,294,376	71,041,000
1910	3,714,089	10,160,000	19,322,634	77,437,000
1911	4,017,803	12,655,000	20,502,342	89,604,000
1912	3,708,783	12,794,000	20,523,035	96,685,000
1913	3,180,208	9,961,000	21,421,337	93,321,000
Wood, semimanufactured, articles of:				
1909	2,380,384	17,552,000	20,965,394	161,470,000
1910	1,610,881	15,911,000	21,432,294	171,152,000
1911	1,322,302	15,538,000	21,553,368	182,517,000
1912	1,768,763	23,323,000	20,872,059	190,322,000
1913	1,547,213	18,648,000	20,153,470	174,205,000
Wood, manufactures of:				
1909	96,343	21,551,000	378,710	64,996,000
1910	106,365	26,207,000	418,350	75,923,000
1911	125,841	32,413,000	431,956	78,861,000
1912	130,938	36,743,000	455,249	86,170,000
1913	126,400	39,316,000	457,920	85,625,000
Total:				
1909	6,965,240	50,295,000	39,638,480	297,507,000
1910	5,431,335	52,278,000	41,173,278	324,512,000
1911	5,465,946	60,606,000	42,487,666	350,982,000
1912	5,608,484	72,860,000	41,850,343	373,177,000
1913	4,853,821	67,925,000	42,032,727	353,151,000

While lumber exports increased in quantity, they increased more in value up to 1913, owing to the rapid rise in prices in Austria-Hungary. The prices of American lumber did not increase so much, and American yellow pine began to be imported and used in Italy for many purposes for which Austrian spruce had filled the requirements.

The wood exports from Austria-Hungary in 1913 were distributed among the various countries of destination as follows:

Countries of destination.	Crowns.	Per cent.	Countries of destination.	Crowns.	Per cent.
Argentina	4,047,000	1.15	Russia	11,416,000	3.23
Egypt	7,093,000	2.01	Switzerland	11,878,000	3.36
France	9,805,000	2.78	United Kingdom	6,507,000	1.84
Germany	118,639,000	33.59	United States	3,913,000	1.11
Greece	3,627,000	1.03	Other countries	63,626,000	18.02
Italy	86,319,000	24.44			
Roumania	26,281,000	7.44	Total	353,151,000	100.00

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For some time prior to the war there were two temporary associations, one in Austria and one in Hungary, organized largely for the export selling of Austrian spruce. Each large lumber manufacturer had his own agent in Italy. The associations divided the territory more or less, so as not to compete too strongly with each other. It frequently happened that two or more agents would sell Austrian spruce in the same city, but all agreed to sell at the same price. Owing to the selling of the products on the same price basis and to concerted efforts, the prices for Austrian spruce rose 20 to 25 per cent in the 5-year period before the war.

The Austrian lumber manufacturers usually had both agents and traveling representatives abroad, the latter visiting the agents two or more times during the year. The agents often had wholesale yards in which to keep lumber stocks and from which to distribute lumber to the various retail yards, both in the same city and in the vicinity. These agents usually received about 2 per cent commission. For incidental expenses, such as telegrams, cables, and postage, they were reimbursed by the manufacturer. Sales were made c. i. f. The manufacturers usually agreed that the contracts of 4 to 5 per cent for agents' commissions and expenses in sales were to be made in the fall for winter and spring delivery, but business continued through all the seasons. The contracts were usually made for the year's supply on so many car lots. Owing to the somewhat restricted supply of lumber in Austria-Hungary, exports were prohibited on August 1, 1914, so that the activities of the lumber export associations were cut off at that time.

Several large Italian concerns were interested in the manufacture of lumber in Austria and its exportation to Italy. Some of these concerns owned large tracts of timber in Transylvania and were also interested in bids for stumpage in the Government forests. Occasionally these manufacturers, through their agents in Italy, sold directly to the largest consumers of lumber, such as car-construction factories, shipyards, and large contractors and builders. They also sold to wholesale merchants, as well as to the larger retail yards, but they were careful not to interfere too much with the wholesalers, who had long-established relations with them. Wholesalers usually had large lumber yards at the port or large distributing centers and they distributed the lumber to the smaller country towns and cities and ports throughout the peninsula. The agents usually bought for the wholesaler's account.

The so-called Austrian timber trust, or syndicate, which was organized in Vienna in 1911, operated chiefly in Transylvania, Galicia, and Roumania. Consequently, most shipments of this trust were sent from Black Sea and Danube ports and very often by rail from Trieste. The principal ports of shipment were Odessa, in Russia; Galatz and Braila, on the Danube; and Constantza, on the Black Sea coast of Roumania. This trust did not send a great deal of lumber to Italy, but in recent years it sent more or less to Sicilian and south Italian ports. Its chief business was done with Greece, the Levant, and North Africa.

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SPECIAL FEATURES AFFECTING IMPORTS OF LUMBER.

CUSTOMS TARIFF.

Practically the same customs tariff has been in effect in Italy since the law of November, 1895. As is true of most European countries, there is a favored-nation arrangement whereby certain countries obtain a rate of duty more favorable than that extended to other countries. The United States is one of the so-called favored nations.

Generally speaking, there are no customs duties to prevent the importation of American lumber to Italy. There are some restrictions on certain forms of dressed lumber, as is noted below. But generally speaking, this market does not want dressed lumber, and it is not likely that in the future there will be a demand for lumber already planed and dressed to finished size in the United States. One of the largest lumber agents in Italy has imported only 502 cubic feet of dressed lumber for the last eight years, and this shipment was sent without order and was disposed of to local merchants. Italian lumber users preferred to dress their own lumber to suit each particular purpose.

The following table shows the duties on wood products according to Class 9 of the official customs tariff of Italy. Of the two rates of duties, the conventional rate listed in the second column is the one that applies to the United States. There is no discrimination in the matter of lumber imports between this and any other lumber-exporting country.

Tariff No.	Articles.	General rate of duty.	Conventional rate of duty.
229	Wood:		
	a. Common *a*—	*Lire.*	*Lire.*
	1. Rough or simply hewn with the ax.....per ton..	5.00	Free.
	2. Squared, sawn lengthwise.....do....	7.00	Free.
	3. Small boards for boxes, sieves, etc.....per quintal..	2.00	Free.
	4. Veneers under 2 millimeters in thickness.....do....	4.00	.....
	5. Hoops of any size.....do....	2.00	Free.
	6. Wood shaped for matches.....	Free.	Free.
	b. Cabinetmakers' wood—		
	1. Not sawn.....per quintal..	2.00	.....
	2. Sawn lengthwise.....do....	4.00	3.00
	3. Boards or inlaid squares for flooring.....do....	6.00	4.00
233	Oars, poles, and stakes.....	Free.	Free.

a In virtue of the treaty with Austria-Hungary, boards (large and small) for articles intended for packing purposes; boards and squares for flooring, neither inlaid nor glued; and, in general, all articles of common wood that are not finished, even if planed, grooved, or dovetailed, are included under 229a2. Boards, squares, and sheets, and sheets for veneers, of common wood, 2 millimeters or more in thickness, are classed under 229a2. Shingles and staves are dutiable under 229a1.

RATES OF EXCHANGE.

Rates of exchange have had an important bearing on the importation of lumber to Italy. In periods when foreign rates of exchange were advantageous more orders were placed, provided that shipping rates and lumber prices also were attractive. It also often happened that orders were placed in those countries which happened to offer the lowest advantageous rates at a particular time. For instance, if the rate of exchange as between Italy and the United States was

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much more favorable to the Italian buyer than happened to be the case with Austria, this was sometimes a sufficient incentive for placing an order in this country. However, as was explained in other portions of this report, American lumber was often bought to fill a particular need, and it was only in the case of the cheapest forms of lumber that the American product was used for the same ordinary purposes as Austrian spruce and local pine and fir.

Purchases from the United States were made largely in English pounds or American dollars or occasionally in French francs, whereas from Austria they were made on the basis of French francs, Austrian crowns, or Italian lire. Baltic lumber was generally purchased in English pounds and cleared through English banks. There was often considerable fluctuation in the value of Italian money, especially in times of economic or political disturbances. Consequently it was important at times whether purchases were made in American dollars or Italian lire or French francs. The normal gold rate of exchange as between dollars and Italian lire was $1=5.18 lire, or 1 lire=$0.193. The ordinary commercial rate of exchange as between dollars and lire before the war was about 5.20 to 5.60 lire to the dollar.

The balance of trade is of course the great factor in regulating rates of exchange. Since the outbreak of the great war this balance has been seriously upset and there has been a great disparity between the values of imports and exports. Prior to the war the balance that Italy owed the United States as a result of the excess of imports into Italy from this country as against exports from Italy to this country was offset by the following factors, which tended to stabilize the rate of exchange: (1) Money sent back to Italy by emigrants in this country; and (2) considerable sums of money spent in Italy by American tourists.

Immediately after the war broke out the value of the lira depreciated, as the ordinary stabilizing influences were absent. The value of the American dollar appreciated steadily until June, 1918, when the extreme rate of 9.21 lire per dollar was paid. Shortly thereafter, however, it dropped rapidly, until on September 1, 1918, it was 6.32 lire to the dollar. Since that time, until the winter of 1919, it has been 6.32 to 6.36 lire to the dollar.

Within the last year or more banking facilities have been established to promote closer trade relations between Italy and the United States. Two American banks have been established in Genoa and two of the most prominent Italian banks have established branches in New York. These and other developments will tend to stabilize rates of exchange in the future, so that there will be less likelihood of loss on the part of lumber importers and agents.

An approximate average value for the lira for each war year has been used for converting statistics; figures referring to years previous to 1915 have been converted at the normal rate. The conversion of prices quoted in lire at an average rate for the lira in a given year may not represent the prices at any given period of that year; but such conversions over a series of years will give a rough idea of the change in commodity values. It should be borne in mind that prices in lire may remain approximately the same or may increase gradually during a period of months in which the exchange value of the lira was declining rapidly. Within that limited period, therefore, if prices were converted at the current rates, the fall in exchange would make

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apparent a fall in prices, stated in United States currency, which, stated in lire, were constantly rising throughout the war period. The conversion of prices at the exchange rate for the year, however, makes possible a general view of the rise in prices during the war, owing to the increased demand, even after allowance has been made for the decrease in the exchange value of the lira.

The following rates for the lira have been used for the last four years: 1915—16.5 cents; 1916—15.2 cents; 1917—13.3 cents; 1918—13.5 cents.

OCEAN AND RAIL FREIGHT RATES.

The cost of moving lumber to Italy has been one of the most important considerations in successfully entering the Italian market. In spite of a freight rate for lumber from the United States considerably higher than that for Austrian lumber, American lumber has been able to compete. The rate from the United States is only slightly above that for the lumber from the Baltic countries. Freight rates are subject to considerable fluctuations and they depend upon competition for tonnage, seasons, place of bidder, possibility of obtaining loading and carriage of return cargoes, and a number of other factors. The amount of lumber coming by rail from Austria has been shown in another table under transportation facilities.

The freight rates on southern yellow pine from Gulf ports in the United States to west-coast ports in Italy (Genoa, Naples, Palermo, etc.) averaged about 90 shillings per standard ($11 per 1,000 feet) before the war; the extremes were 70 to 110 shillings per standard ($8.50 to $13.50 per 1,000 feet). This was based upon cargo lots in steamers. The rates for sailing vessels were generally about 5 shillings per standard ($0.60 per 1,000 feet) less than for steamer rates. Most of the recent business from the United States has been done on steamers, whereas 10 years prior to the war, sailing vessels were chiefly used. These vessels were largely of Italian registry, but there were some Norwegian vessels. Some of the steamers were English and a few were under Italian registry. The steamers carried an average cargo of about 1,000 standards, whereas the sailing vessels carried only 100 to 500 standards each. For deck loads only about two-thirds of the current freight rate was charged. In the case of steamers about 15 per cent of the entire cargo was carried on deck, whereas in sailing vessels only 10 per cent was carried in this way. Hardwoods were sent almost entirely in parcel lots on regular steamers, and the freight rate was about 20 to 30 per cent above that given for pine lumber in full cargo lots.

The freight rates went up rapidly after the war. In August, 1915, the rate was 190 shillings per standard ($23.50 per 1,000 feet) from New Orleans to Genoa by regular steamer and 175 shillings per standard ($21.50 per 1,000 feet) in sailing vessels. During 1917 the rates rose as high as 500 to 600 shillings or more per standard ($61.50 to $73.50 per 1,000 feet). During 1918 it could not be said that there were any prevailing rates, as it was almost impossible to secure tonnage and the rates were prohibitively high.

Freight rates from Austrian and Black Sea ports were quoted generally on the basis of Italian lire or French francs per cubic meter. The rate from Trieste, Fiume, and other Adriatic ports to Italian ports varied before the war from about 8 to 13 lire per cubic meter ($3.65 to

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$5.90 per 1,000 feet, at 424 board feet to the cubic meter), depending upon port of destination, time of year, etc. The rate of 8 to 10 lire ($3.65 to $4.55 per 1,000 feet) prevailed to the nearer ports, such as Ancona, Venice, Taranto, Brindisi, Barletta, Malfetta, and Rimini, and the rate of 10 to 13 lire to Sicilian, Sardinian, and west-coast ports, such as Palermo, Messina, Genoa, Cagliari, Civita Vecchia, Naples, and Leghorn. Rome receives its lumber through both Ancona and Civita Vecchia. Practically no lumber comes from Austria by rail to consuming centers south of Florence. From Black Sea and Danube ports, such as Galatz, Odessa, and Constantza, the rate was generally 15 to 18 francs per cubic meter ($6.80 to $8.20 per 1,000 feet). Constantza is the only year-round port, the others being blocked with ice during the winter months. Cargo loads of 400 to 600 metric tons were the rule. From the Baltic ports the average rate was about 50 to 65 francs per standard ($4.90 to $6.35 per 1,000 feet) in cargo lots. Very few shipments came to Italy from the Baltic. Deck loads were brought at two-thirds of the regular freight rate.

Tonnage was usually obtained through Italian freight brokers. Freight is paid for by the importer upon arrival of cargo, and the amount is deducted from the total amount of the invoice.

The freight rate for lumber from the the United States had an important bearing on the quality shipped. For example, when freight rates were high, better-class stock was shipped. In fact, it became a recognized rule that low rates meant cheap lumber and vice versa.

The following table shows the pre-war cost in lire per car lot of about 10 metric tons, containing 20 cubic meters of Austrian spruce, from some of the shipping points in Austria to various Italian frontier stations:

Shipping points in Austria.	Austro-Italian frontier points.			
	Peri.	Pontebba.	Cormons.	Cervignano.
	Lire per car.	*Lire per car.*	*Lire per car.*	*Lire per car.*
Feldkirchen	134	60	83	98
Friesach	153	78	90	105
Greifenburg	99	88	115	130
Spittal	109	75	102	117
Villach	115	56	83	98

The following table shows the distances in kilometers (1 kilometer = 0.621 mile) from the frontier stations mentioned in the foregoing table to Genoa, and the cost of transportation per car:

Austro-Italian frontier points.	Distance from Genoa.	Cost of transportation.	Austro-Italian frontier points.	Distance from Genoa.	Cost of transportation.
	Kilometers.	*Lire per car.*		*Kilometers.*	*Lire per car.*
Peri	327	164.10	Cormons	519	223.10
Pentebba	569	238.10	Cervignano	484	213.10

In general, the total transportation expense amounts to about 15 or 16 lire per cubic meter, or 300 to 320 lire per car, including station fees, statistical fees, etc.

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INSURANCE AND WAR RISK.

All shipments of lumber are insured against loss; otherwise the banks would be unwilling to discount drafts, since their security lies in the cargoes themselves.

Under normal conditions prevailing before the war, the average insurance rate was about 1 per cent on the value of the cargo (amount of invoice and freight) in steamers, 3 per cent on cargo in first-class iron or steel sailing vessels, and up to 6 per cent on cargo in wooden sailing vessels. There was a slight advance for the so-called hurricane season in the Gulf; that is, from July to September. These figures are based on cargo shipments from Gulf and South Atlantic ports to west-coast Italian ports. The insurance on the deck load was two to four times (usually about three times) as much as on the whole load, the rate depending on the amount, general character, method of piling, etc. A reduction of ½ to 1 per cent was customary when no deck load was carried. The deck loads varied from 10 to 15 per cent of the total amount of the cargo. Insurance was usually carried by English and Italian firms.

War-risk insurance was about ½ or 1 per cent at the beginning of the war. It rose rapidly to 5, 7, 10, and 20 per cent as the hazards increased. The Italian Government initiated war-risk insurance in 1916. In the spring of 1918 the marine insurance on steamers from Gulf ports to Genoa was placed at 6 per cent and on sailing vessels at 12 per cent. On account of the dangers from submarines, sailing vessels always came to Italian ports in tow from Gibraltar.

METHODS OF FINANCING LUMBER SHIPMENTS.

The general method of financing lumber shipments to Italy from the various countries of origin is similar to the methods pursued throughout the European countries, with the possible exception that Italian buyers want longer credit. This desire for easier terms of payment is founded more on habit than anything else. Although Italian buyers of merchandise in general, as well as of lumber, often express a wish to buy American commodities, they hold out the demand of American exporters for cash against documents as a real difficulty in the way of doing business. There is no doubt an opportunity now for the American exporter and the Italian buyer to come to a better understanding of each other's point of view so that the former difficulties of finance may be adjusted.

German and Austrian houses have made much more liberal terms than those in other countries, and in many cases they have obtained the business on this basis. Austrian lumber, in general, is paid for by the Italian buyers four months from the date of the bill of lading. Although the Italian lumber merchant often buys through an agent, the Austrian manufacturer of lumber is usually paid direct. In some cases the Italian purchaser buys on the c. i. f. basis, and documents are sent through the bank in the same way as in the United States.

The Baltic business is very small; it has been handled largely in parcel lots and very infrequently in steamer cargoes. Liberal terms are generally offered by the Baltic shippers also; it is common to make payment in 2, 4, 6, or even 8 months from the date of the bill of lading.

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In shipments of lumber from the United States the practice has been to pay cash in dollars in the case of hardwoods, which are always shipped in parcel lots, and in pounds sterling for southern yellow pine, on the delivery of documents at the bank in Italy. It has been customary to offer a 2 per cent discount for cash and 2 per cent for commission, together with 1 to 2 per cent on a "del credere" agreement. This makes a total discount of 5 to 6 per cent from the total amount of the bill. The documents, including the bill of lading, insurance policy, inspection certificate, if any, etc., are sent by mail after being delivered by the shippers to the bank in the United States. The banks discount the documents to the shippers so that the method of payment is really c. i. f.

Sometimes the freight charges are paid as follows: One-third against the draft payable in 60 days from the date of the bill of lading and 40 per cent of the remainder against the draft payable in 10 days after arrival of cargo, 40 per cent against the draft in 30 days after the arrival of the cargo, and the balance in cash immediately after the unloading of the cargo.

The Austrian business is commonly paid through the Paris banks and in francs at a stated rate of exchange. When the business is done direct by the Austrian and Italian banks payment may be made either in Austrian crowns or in Italian lire. Baltic and American business has generally been handled through English banks, and payment has been made as stated. Owing to the general establishment of American banks in European countries during the war, and especially in Italy, it is believed that the business between the United States and Italy will be handled direct through these banks. It is believed, moreover, not only that payment will be made direct but that much of the business will be handled direct. The English banks and brokerage houses that formerly handled a good share of the business will be a much less important factor.

QUALITY VERSUS PRICE.

The Italian lumber market does not take the high quality of lumber that is required for the German, Dutch, and English markets under normal conditions. The usual quality imported to Italy (from the United States in the case of yellow pine) is Genoa prime, with small amounts of merchantable and prime, according to the Gulf-Coast classification rules of 1910. It is a mistake, however, to regard Italy as a dumping ground for cheap lumber. This attitude has sometimes reflected unfortunately upon American lumber, because in some quarters it was felt that Italy would take lumber that could not be sold elsewhere. For certain purposes Italy requires the highest grades and is willing to pay the prices for them.

During the reconstruction period following the war, it is believed that the price consideration will be very important because Italy's war debt is large. After the reconstruction period is over, however, and the problems immediately following the war have been met, large quantities of better-class lumber of both hardwood and softwood varieties will be required, especially for car construction, shipbuilding, furniture, vehicle stock, flooring, airplane stock, etc. The question of delivered prices will be very important in capturing a large share of the lumber market.

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ATTITUDE TOWARDS DEFECTS.

Generally speaking, imported lumber is better manufactured than Italian lumber, and is far superior in quality, condition, and other respects. Nevertheless, there is unquestionably great room for improvement in the average quality and condition of lumber sent from the United States to Italy. The Baltic and Austrian lumber product is much better manufactured and seasoned and more carefully graded. Importers of Baltic and Austrian lumber state that these products are carefully air-dried for 5 to 8 months and usually arrive in well-seasoned condition. Proper seasoning prior to shipment obviates deterioration en route to destination and prevents disputes and claims. Baltic pine and Austrian spruce usually arrive clean, with very little, if any, sap stain, and they are seldom warped or twisted in any way.

The Italian lumber trade is much opposed to receiving stained or "blued" lumber. Complaints are almost always made when any considerable portion of the cargo is received in this condition. This situation is no doubt largely responsible for the orders for kiln-dried saps used for flooring purposes. Wane is not considered a serious defect; in fact, a large part of the small-dimension stock, locally produced, as well as lumber, is frequently waney on the edges. It is possible that a number of manufacturers might be able to get practically the same price in the Italian markets for lumber and timbers shipped with more or less wane. The Baltic countries have done this to excellent advantage in several cases.

The lumber merchants of Italy, as well as the users, look very carefully at the rings on the ends of southern-yellow-pine timbers. They regard wide-ringed southern pine with much disfavor in timber sizes, even if it is long-leaf pine. Consequently it is desirable to ship a close-ring pine, if possible. This is more or less a prejudice, which is not well founded in many cases, and no doubt the Italian market could be educated to the density rule, by which timbers for structural purposes should contain narrow rings and have a large proportion of summer wood, whereas timbers for general finishing purposes need not necessarily be of the close-ring variety and have a large proportion of summer wood.

The reddish-colored heartwood of the Baltic pine is not regarded with nearly so much favor as the sapwood from the same tree. Consequently Baltic lumber with a high percentage of sapwood is much preferred. The sapwood is more uniform in color, more workable, more free from knots and other defects, and less likely to check.

The Italian market likes to receive large-size timbers; that is, timbers of 25 to 30 or more in cubic-foot average. Italian lumbermen do not like to have a few of extremely large size, because much smaller-size material must be included in the same shipment. They have had to adapt themselves to receiving timbers and lumbers from the United States cut in various lengths, and this necessity has not militated against the further sale of American lumber in Italy. The Austrian lumber manufacturers sent out much of their product in 4-meter lengths, which is exceedingly short as compared with lumber from the United States. American lumber merchants should capitalize this feature in preparing for future competition in the Italian market.

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REQUIREMENTS AND PLANS FOR RECONSTRUCTION.

The area of the invaded and devastated region of northeastern Italy is approximately 4,800 square miles. The population in this area was about 1,500,000, of whom more than one-third, or 500,000 to 600,000, escaped before the Austrian invasion.

Prior to the disaster of Caporetto in October, 1917, the Italian front was entirely in mountainous country along the Carnic and Julian Alps, from the fastness of Trieste to Switzerland. Although the forests and smaller towns in this region were laid waste, the total destruction of buildings and dwellings was not great, owing to the absence of large cities. However, in the advance of the Austrians in October, 1917, and until they were driven out in October, 1918, a large share of the Province of Venetia, which is one of the most fertile, populous, and productive sections of Italy, was laid waste. The devastation in this area was most severe and may be compared with the devastation caused by the Germans in northern France and in Belgium.

The principal cities in the invaded region, with their population according to the census of 1911, are as follows:

Udine	46,916	Portogruano	12,374
Belluno	22,342	San Vito	12,265
Vittorio	21,946	Cividale	10,031
Feltre	18,248	San Daniele	7,933
Conegliano	13,007		

The reconstruction of buildings is one of the most important problems facing Italy and will require, no doubt, very large quantities of lumber. On the assumption that there are 6 persons to a family, the devastated area contained about 250,000 dwellings.

As is the case in northern France, only a small proportion of the dwellings contained in the invaded sections will need entire reconstruction. Making a conservative estimate, there will probably be 100,000 structures to be reconstructed. If there are five doors to the average house and as many windows, it means that there must be supplied at least 500,000 doors and 500,000 windows, together with frames, casings, shutters, blinds, etc.

It is believed that reconstruction will follow the general lines of the original structures. The factor determining the kind of structure to be built is the desire of the individual owner of the property, and the owners in all likelihood will want the same general kind of dwelling that their forefathers have used for centuries. However, large supplies of lumber will doubtless be required for temporary housing and rough structures of all kinds for farm animals and miscellaneous purposes. Most of the permanent buildings will probably be made of stone, concrete, brick, plaster, and substitute materials, rather than of lumber. The demand for lumber will be for flooring, doors, windows, floor jambs, roofs and rafters, and trimmings. There will be no large market for ready-cut houses.

The demand for lumber even for these purposes is likely to be large, and owing to the heavy national debt of Italy, as low-priced lumber as can be obtained will probably be utilized. It has been estimated that reconstruction alone in this devastated portion will require in the neighborhood of 1,000,000,000 board feet. The demand for

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replenishing depleted lumber stocks for wood-using industries and for general purposes will be much larger than the demand for reconstruction alone.

There is an opportunity for enterprising and intelligent propaganda in favor of the greater use of wood in the reconstruction of these devastated areas. Such propaganda no doubt would result in the greater use of wood, but no wholesale commitment to the use of lumber as a building material is to be expected.

The reconstruction of the devastated area may require 5 to 10 years for completion.

In July, 1918, there was formulated under the Ministry of Commerce at Rome a special commission designed to study general reconstruction problems in Italy. This included not only the reconstruction of the devastated areas, but finance, emigration, labor, foreign commerce, customs tariffs, and several other problems associated with the general economic and financial readjustments. A large number of subcommittees were appointed to study and report on the different problems. One of the Italian officials reported as follows regarding the reconstruction of the devastated areas:

> Among the many problems besetting Italy now that hositilities have ceased, none is perhaps so urgent as that of restoring the invaded, devastated lands to their former state of prosperity. The northern region of Italy from Stelvio, the Tonale, the Piave, and from the heights of Mount Grappa to the new boundary of Italy has been a fighting ground for the last four years. It has been shelled by the enemy, seized and laid waste by the enemy, and finally shelled by Italian guns in the last triumphant drive that regained the territory for Italy.
>
> A survey of this region has disclosed that lines of communication are in very bad condition and are seriously interrupted by damage to bridges and miles of roadbed; dwellings are for the most part leveled to the ground and the few still standing are without windows, doors, or roofs, and are practically worthless; more than half the fields are barren; stocks of food and forage are sadly depleted and pack horses are exceedingly scarce in most zones and totally unavailable in others; all telephone and telegraph communications have been destroyed or are seriously damaged. A huge task of reconstructing this region now faces Italy.

The committee on raw materials is studying the needs of Italy for lumber, as well as other materials for reconstruction. It is approaching the problem in the following manner: First, the normal stocks of lumber before the war are returned, then what has been consumed and used during the war; the lack of imports during the war, the present remaining stocks, the extent to which the local forests have been exhausted and will be prepared to furnish lumber after the war, and the amount of imports which will be necessary following the declaration of peace. At the time of writing no report has been made by the subcommittee.

Until the armistice the Government had control of all lumber holdings, and this control continued in large measure until the beginning of 1919. It is unlikely, however, that the Government will continue the control of properties for a long period.

OUTLOOK FOR LUMBER TRADE WITH ITALY.

CHANGES BROUGHT ABOUT BY WAR.

During the war the normal imports of lumber into Italy have been cut off to a serious extent and available lumber stocks in retail and wholesale yards depleted, but the domestic production has increased by 200 to 300 per cent. There will be a heavy demand for lumber for the reconstruction of the devastated areas, aside from the require-

ments to restore lumber-yard stocks and the demand for new buildings. Furthermore, there has practically been no manufacture of furniture, freight and passenger cars, trolley cars, vehicles, wood novelties, etc., and there is a serious shortage of supplies for shipbuilding purposes, crating stock, building operations, etc. In addition there has been a great development in shipbuilding enterprises, airplane manufacture, and industrial enterprises, which will mean a greatly increased demand for lumber and timber.

Many cities in Italy have appropriated millions of dollars for the construction of public buildings, schools, hospitals, etc., and many private corporations have made plans to engage in extensive building developments in such rapidly growing centers as Rome, Genoa, Florence, Milan, and Turin, which have been greatly congested during the war. An unusually heavy tourist traffic is anticipated, and many hotel proprietors are considering the erection of modern hotels, which will mean an increased consumption of lumber, as well as orders for woodworking plants, planing mills, and sawmills.

One of the most serious situations created by the war and one that will require large quantities of foreign products after the war, is the condition of the Italian State and municipal railways. Not only will a large share of the rolling stock need to be replaced, but all the railroad tracks will require repairs. Large numbers of crossties will be required, as well as material for bridges and for the construction of passenger and freight cars.

The mines, which have developed during the war on account of Italy's comparative isolation, will need large quantities of imported lumber and timber stocks. A large share of this material was supplied from the Italian forests, but with their comparative exhaustion, foreign sources must be resorted to.

OPPORTUNITY FOR DEVELOPING TRADE IN AMERICAN LUMBER.

The opportunities for developing the export lumber trade from the United States to Italy must be viewed with the following considerations in mind:

(1) There is a definite opportunity to carry on an intelligent and well-directed campaign of exploitation of the Italian lumber market. Personal visits not only to agents, importers, and lumbermen, but to architects, builders, industrial engineers, etc., should aid in increasing the lumber trade. Tactful and intelligent advertising of American lumber will doubtless assist materially. The Italian lumber trade is open-minded about American lumber and will be glad to receive price lists, descriptive literature, etc., if printed in Italian. Although some of the larger firms read and speak English very well, most of the propaganda work should be done in the native language.

(2) Lumber consumption in Italy has been rapidly increasing in the last few decades. This can be measured by the total as well as the per capita consumption. Aside from the unusual situation arising from the war, this is an excellent index of the probable future demand.

(3) The requirements for each particular field for lumber consumption in Italy should be carefully studied, and then the lumber best suited to that particular field should be sent.

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(4) It is possible to demonstrate through carefully directed advertisements the advantages of lumber for purposes for which it has not been employed to any large extent or for which its use, already known, can be materially extended. A few of the many lines that may be mentioned are wood-block paving, general construction, store and office fixtures, and wharf and dock construction.

(5) It is extremely likely that not only the business negotiations but the actual lumber shipments and the banking as well will be done direct in the future. Transactions through many hands increased the expense to the ultimate consumer and decreased the profits to the manufacturer.

ADVANTAGES OF AMERICAN LUMBER OVER COMPETING FOREIGN WOODS.

The advantages of American lumber over foreign woods competing with it in the Italian market may be summarized as follows:

(1) There is a great variety of lumber to suit each particular need. The Baltic countries have only two soft, weak, and perishable softwoods. Austria has only spruce, white oak, and beech for export, whereas the United States has at least 20 varieties of important softwoods, and at least 30 varieties of important hardwoods; and these woods are of various degrees of strength, stiffness, durability, workability, attractiveness of grain and figure, hardness, size, and price. The Italian market is not at all acquainted with what the United States is capable of producing.

(2) Large sizes are obtainable in the United States, particularly in widths, but in lengths and thicknesses as well. This fact gives American woods great advantage over competitive woods. Austrian spruce is seldom available over 12 inches in width, and Baltic pine is usually limited to about 9 inches. Widths over 10 inches in Austrian spruce and over 8 inches in Baltic pine sell for much higher prices. In fact, in much of the lumber trade in these woods the relative prices depend almost directly upon the widths. This is naturally the case in view of the fact that the native timber trees in those countries do not grow to large sizes and can not be compared with the trees in the important American forests. Slavonian oak is obtainable in large sizes, but they are prohibitively high in price for many purposes. The largest sizes, of which the quantity is small, are sent only to Germany and England and occasionally to France for some highly specialized purposes. Large sizes, in both width and length, are especially necessary in softwood lumber for certain kinds of cars, shipbuilding, heavy building construction, bridge and factory timbers, etc. The United States is the only country that can supply material of this kind.

(3) The existence of uniform grades for every kind of American lumber is a great potential advantage for American lumber, which has not been utilized in the past. The grading rules are little known in Italy and are not understood where they are known, because the Italians do not readily understand American phraseology and, of course, they use units of measure that are decidedly different from those of the United States. The American grading rules should be printed in the Italian language and widely distributed among the lumber trade in Italy.

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(4) A large and continuous supply of lumber is available in the United States. The forests of Austria were overcut for several years preceding the war, whereas the United States has a continuous and dependable supply that can be utilized for many years to come.

(5) Clear stock is available owing to the large-size trees of the United States. This is an important consideration when the lumber is to be utilized in Italy for furniture, car construction, cabinetwork, vehicle stock, tools, machines, etc., because it is practically impossible to obtain absolutely clear stock in Baltic pine or Austrian spruce. Occasionally Austrian and Slavonian white oak is offered in clear stock, but the percentage of such material is very low, and it is offered at prohibitive prices.

ADVANTAGES OF COMPETING LUMBER OVER AMERICAN LUMBER.

The advantages of competing lumber from other foreign countries over lumber sent from the United States are as follows:

(1) Baltic and Austrian lumber as a general rule is well manufactured. The lengths vary little from stated sizes. Austrian lengths are largely 4 meters, and when the lumber is piled in the yard there is little variation in the lengths of the individual pieces. This is true also of the small amounts of Baltic timber coming to Italy, in connection with the width and thickness, as well as the length. One finds a variation of only a few millimeters in width between two different yields. Lumber from southern Russia, however, is not so well manufactured, and there is a distinct prejudice against lumber manufactured in Russia. However, it is likely that a large share of the lumber credited in the statistics to Russia and Roumania actually comes from Austria-Hungary.

(2) Lumber from Austria and the Baltic countries, especially Baltic pine, is branded. The brands consist of painted stencils on the end of each piece, usually in red or blue. Each conventional design indicates the place of manufacture, the grade, and the species. Thus the brand fixes the responsibility for the product and also serves as an excellent advertisement. Many disadvantages and difficulties of the export trade have been obviated or partly eliminated by this excellent system of branding.

(3) Austrian and Baltic lumber is usually well seasoned before shipment to Italy, so that it arrives in excellent condition, and further deterioration is usually avoided. Especially is this true of Baltic pine, which is seasoned as a rule for at least five months in open piles. This is an exceedingly important consideration, because the hot, dry summers and cold, damp winters of Italy are apt to cause serious deterioration in poorly seasoned lumber.

(4) Austrian spruce cut in 4-meter lengths finds a ready market when this particular length is especially desired. Many structures are designed to use the 4-meter length, and for this reason American yellow pine has often been cut in this length. A large share of the construction work is not wholly dependent upon the 4-meter length, however, which is therefore not exceedingly important.

(5) The lower freight rates of the competing woods to Italian points of destination are of great importance. In spite of them, however, American lumber has been able to sell on the Italian market

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on a competitive-price basis. Although the freight rates to Italy are somewhat lower from Black Sea, Adriatic, and Baltic ports than from the United States, the stumpage values and f. o. b. prices at ports of loading have been materially lower in the United States.

INADVISABILITY OF CHANGING AMERICAN STANDARDS.

It is considered unnecessary to change the standards of measure by which American lumber is sold and manufactured. The Italian lumber market is accustomed to receiving both American and Baltic lumber cut in feet and inches. The official Italian standard of measure is the metric system, but the Italian merchants convert American sizes to centimeters for width, millimeters for thickness, and meters for length. Whereas lumber is usually imported on the basis of the St. Petersburg standard, and timber by the load of 50 cubic feet and by the cubic average, they are generally sold on the basis of the cubic meter.

Austrian and locally cut lumber is manufactured according to the metric system, but there are so many different intermediate sizes that the sizes of American lumber can be readily expressed in metric measurements even though it is manufactured in feet and inches. The almost universal consensus of opinion obtained from the most prominent importers, merchants, and agents was that in the face of the prospective demand it would be unnecessary and therefore inadvisable to change to metric standards in order to enter the Italian markets more successfully.

HOW THE AMERICAN PRODUCT MAY BE IMPROVED.

The following recommendations with regard to the improvement of American lumber represent a consensus of the opinion of the leading contractors and builders, industrial engineers, railroad engineers, managers of wood-using plants, agents, importers, and timber merchants in Italy:

(1) The system of grading the different qualities of American lumber should be simplified, particularly in nomenclature. Grades of lumber from competing countries, although more confusing than those from the United States, are much simpler in name. That is, the best quality is usually called "firsts," second quality "seconds," third quality "thirds," etc. A log-run quality is usually called "unsorted" or miscellaneous, in the case of Baltic pine and "tombante," which literally means the same thing, in the case of Austrian spruce.

(2) It is necessary that American export lumber should be branded to show the grade and mill of origin as well as the species and kind of lumber. Branding is greatly appreciated in European markets.

(3) More careful methods of manufacture should be adopted. Some American lumber sent to the European market was prepared in mills incapable of producing a well-manufactured product, and was therefore unrepresentative of American lumber. However, it is true that Baltic lumber has been much more carefully manufactured than American lumber. The lumber export trade of the United States can be vastly improved by more accurate methods

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in cutting off lengths in standard sizes, and in the gauge of the carriage and arrangement of the head blocks, so that there will be little variation in size at each end of a given piece.

(4) All lumber before being sent abroad should be properly seasoned. In regard to timber, this is not so important, as very little deterioration takes place, and frequently timbers are watersoaked before being loaded and are also thrown into the sea on arrival at destination. Lumber, however, should be carefully seasoned before shipment. Kiln-dried pieces are regarded with great favor because of their thoroughly seasoned condition and their lack of tendency to blue stain or to further deterioration of any kind.

(5) Better loading and shipping facilities should be provided for export shipments. Some of these shipments should be centralized to better advantage.

(6) A system of responsible inspection should be established. The lack of such a system has been the source of many of the most important difficulties in the export lumber trade in the past.

(7) Intelligent and well-directed advertising of American lumber is urgently needed. Already 30 permanent exhibits of 30 different samples of American lumber have been placed in all the principal cities of Italy in chambers of commerce, building exhibits, technical institutes, the Royal Forestry College, schools of engineering, and other public buildings and institutions where they may be inspected to advantage. This is, however, only a temporary measure and should be followed up by descriptive literature, photographs, samples, etc., placed with individual firms. Grading rules and descriptive literature should be printed in Italian.

(8) A study of each phase of the Italian lumber market should be undertaken, and an attempt made to place American lumber in every quality and dimension to give the greatest and most permanent satisfaction. This is a very important feature, which has been more or less neglected in the past.

(9) The features that do not assist in developing the best and most permanent relationships should be eliminated. Many of these are well known to the lumber manufacturers and have already been discussed at some length in the monograph entitled, "The Export Lumber Trade of the United States," Miscellaneous Series No. 67 of the Bureau of Foreign and Domestic Commerce. [This monograph may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 20 cents per copy.] It is likely, however, that future business will be done on a very different basis. Conditions have changed vitally, and the changes must be met by new methods of doing business.

(10) Prices to the Italian trade should be quoted c. i. f. Italian ports per standard for lumber and per English load or by the cubic average for timber. Even though the lumber is cut to feet and inches, lengths should be expressed in meters as well as in feet, widths in inches and centimeters, and thickness in inches and millimeters.

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Appendix—TRADE STATISTICS.

IMPORTS INTO ITALY, BY CLASSES OF ARTICLES, FROM 1911 TO 1918.

[The normal value of the lira is 19.3 cents. The average exchange value during the war years was as follows: 1915, 16.5 cents; 1916, 15.2 cents; 1917, 13.3 cents; 1918, 13.5 cents.]

Classes of articles.	1911	1912	1913	1914
	Lire.	*Lire.*	*Lire.*	*Lire.*
1. Spirits, beverages, and oils	93,502,414	107,391,909	114,446,050	125,163,887
2. Colonial goods, spices, and tobacco	96,956,830	105,036,477	111,267,816	97,336,361
3. Chemical products, medicinal substances, gums, and perfumery	132,289,044	141,940,929	147,165,040	115,398,547
4. Colors and materials for dyeing and tanning	35,590,237	34,991,204	36,024,041	34,692,387
5. Hemp, flax, jute, and other fibrous plants, except cotton	59,286,227	61,552,755	69,870,250	48,220,155
6. Cotton	406,239,994	397,992,094	389,422,289	369,295,483
7. Wool, horsehair, and other hair	159,711,494	181,349,350	202,370,163	155,500,947
8. Silk	206,933,924	188,856,087	222,560,377	140,624,367
9. Wood and straw	179,058,281	176,546,123	172,542,662	149,857,841
10. Paper and books	42,839,332	46,019,374	48,037,076	45,101,385
11. Hides and skins	143,721,708	153,834,046	151,824,830	133,599,690
12. Minerals, metals, and manufactures thereof	571,957,901	632,057,963	578,047,617	458,151,635
13. Vehicles	32,973,559	35,809,232	48,800,102	27,647,504
14. Stones, earths, pottery, glass, and crystal	382,065,348	464,346,374	475,590,374	416,466,960
15. India rubber, gutta-percha, and manufactures thereof	64,317,076	69,390,940	59,809,412	47,783,006
16. Cereals, flour, paste, and vegetable products, n. e. s	482,127,881	630,087,522	568,943,891	349,158,332
17. Animal products and waste, n. e. s	254,239,797	213,667,923	189,867,002	165,757,233
18 Other articles	45,486,006	61,051,914	59,049,983	43,591,833
19. Precious metals	28,896,500	25,905,900	21,014,400	26,980,400
Total	3,418,194,053	3,727,828,016	3,666,653,375	2,950,327,953

Classes of articles.	1915	1916	1917	1918 [a]
	Lire.	*Lire.*	*Lire.*	*Lire.*
1. Spirits, beverages, and oils	163,331,497	313,075,144	499,668,504	556,434,353
2. Colonial goods, spices, and tobacco	127,099,010	247,072,271	343,778,798	305,491,016
3. Chemical products, medicinal substances, gums, and perfumery	219,392,361	590,801,269	1,350,443,309	1,451,900,937
4. Colors and materials for dyeing and tanning	49,735,700	121,025,161	213,067,917	441,586,702
5. Hemp, flax, jute, and other fibrous plants, except cotton	71,975,479	107,892,786	143,271,490	123,731,465
6. Cotton	486,839,989	723,581,215	1,332,283,590	1,103,483,476
7. Wool, horsehair, and other hair	311,784,545	708,410,105	602,570,650	621,337,440
8. Silk	108,980,521	161,869,888	181,261,250	142,941,317
9. Wood and straw	53,162,056	88,788,818	116,279,318	61,773,845
10. Paper and books	55,710,906	83,209,795	91,202,525	73,400,555
11. Hides and skins	258,886,040	377,321,296	356,364,087	356,694,887
12. Minerals, metals, and manufactures thereof	561,381,046	1,283,539,267	3,467,394,072	2,723,326,007
13. Vehicles	11,898,999	11,843,851	53,508,259	30,564,657
14. Stones, earths, pottery, glass, and crystal	748,791,494	1,512,203,308	1,061,000,870	1,194,110,981
15. India rubber, gutta-percha, and manufactures thereof	70,977,375	83,815,612	90,797,620	102,621,416
16. Cereals, flour, paste, and vegetable products, n. e. s	1,131,370,183	1,418,461,037	3,411,608,881	3,837,315,042
17. Animal products and waste, n. e. s	245,991,239	521,884,509	638,257,780	945,831,510
18. Other articles	26,241,276	35,480,756	38,450,581	29,098 321
19. Precious metals	17,361,100	599,450	387,300	596,000
Total	4,720,911,416	8,390,875,538	13,991,596,801	14,102,239,927

[a] Provisional figures.

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EXPORTS FROM ITALY, BY CLASSES OF ARTICLES, FROM 1911 TO 1918.

Classes of articles.	1911	1912	1913	1914
	Lire.	*Lire.*	*Lire.*	*Lire.*
1. Spirits, beverages, and oils	146,536,667	161,423,488	161,174,919	134,347,074
2. Colonial goods, spices, and tobacco	15,373,971	21,650,671	19,623,482	25,858,592
3. Chemical products, medicinal substances, gums, and perfumery	72,404,391	81,959,904	78,377,612	89,857,870
4. Colors and materials for dyeing and tanning	7,625,455	8,235,999	8,159,300	7,744,878
5. Hemp, flax, jute, and other fibrous plants, except cotton	93,004,558	101,674,574	109,206,402	118,196,791
6. Cotton	225,687,867	199,316,090	256,397,790	208,577,275
7. Wool, horsehair, and other hair	39,524,355	40,263,825	56,871,060	48,897,270
8. Silk	477,597,449	517,332,475	529,971,524	433,238,823
9. Wood and straw	65,272,864	67,355,808	67,023,850	47,561,542
10. Paper and books	22,137,539	20,009,392	22,898,069	16,274,330
11. Hides and skins	67,990,461	75,157,686	85,814,985	64,629,377
12. Minerals, metals, and manufactures thereof.	82,768,576	110,717,399	105,842,611	74,914,518
13. Vehicles	60,342,577	47,877,732	43,352,717	52,659,980
14. Stones, earths, pottery, glass, and crystal	102,950,094	108,969,750	108,652,327	81,567,788
15. India-rubber, gutta-percha, and manufactures thereof	26,042,136	58,459,461	51,094,028	58,178,805
16. Cereals, flour, paste, and vegetable products n. e. s	403,795,594	429,833,346	473,306,671	458,183,350
17. Animal products and waste n. e. s	221,993,596	254,279,633	246,451,234	225,466,284
18. Other articles	73,225,349	92,410,059	87,419,956	64,249,652
19. Precious metals	42,091,700	41,475,200	80,287,200	19,923,300
Total	2,246,365,199	2,438,402,492	2,591,925,737	2,230,327,499

Classes of articles.	1915	1916	1917	1918[a]
	Lire.	*Lire.*	*Lire.*	*Lire.*
1. Spirits, beverages, and oils	159,111,981	121,410,674	189,158,048	377,304,015
2. Colonial goods, spices, and tobacco	43,973,937	20,355,401	18,035,734	10,857,375
3. Chemical products, medicinal substances, gums, and perfumery	132,603,409	212,609,216	238,471,295	144,205,712
4. Colors and materials for dyeing and tanning	9,017,478	11,194,628	15,128,899	13,870,383
5. Hemp, flax, jute, and other fibrous plants, except cotton	124,204,547	200,904,506	298,429,035	255,917,965
6. Cotton	393,099,704	503,723,506	575,878,150	330,976,415
7. Wool, horsehair, and other hair	124,029,660	145,771,945	82,169,650	6,533,675
8. Silk	532,896,388	799,683,628	830,537,327	627,884,647
9. Wood and straw	52,330,904	49,009,726	40,460,028	37,956,162
10. Paper and books	32,306,003	45,158,103	42,104,185	25,637,500
11. Hides and skins	38,994,757	39,647,020	36,776,266	35,515,092
12. Minerals, metals, and manufactures thereof.	115,346,225	111,751,564	195,660,650	109,556,041
13. Vehicles	67,994,352	87,327,479	144,277,152	52,170,453
14. Stones, earths, pottery, glass, and crystal	87,722,986	136,959,555	110,500,351	114,275,180
15. India-rubber, gutta-percha, and manufactures thereof	87,949,110	46,944,993	33,896,050	16,322,750
16. Cereals, flour, paste, and vegetable products n. e. s	312,494,826	330,365,816	301,819,636	221,517,927
17. Animal products and waste n. e. s	163,557,514	149,839,529	66,534,455	47,587,135
18. Other articles	55,809,966	75,672,482	88,678,324	55,437,104
19. Precious metals	3,257,200	1,537,450	432,000	128,000
Total	2,536,700,947	3,089,867,221	3,308,947,235	2,483,653,531

[a] Provisional figures.

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IMPORT AND EXPORT TRADE OF ITALY, BY COUNTRIES OF ORIGIN AND DESTINATION, FROM 1911 TO 1915.

Countries of origin and destination.	1911	1912	1913	1914	1915
IMPORTS FROM—	*Lire.*	*Lire.*	*Lire.*	*Lire.*	*Lire.*
Argentina	106,805,000	150,405,000	166,622,000	39,873,000	480,055,000
Austria-Hungary	288,914,000	294,479,000	264,660,000	233,815,000	45,993,000
Belgium	82,027,000	84,628,000	77,047,000	55,516,000	5,928,000
Brazil	50,308,000	64,345,000	55,311,000	49,177,000	77,036,000
British India	172,230,000	140,399,000	146,037,000	139,349,000	221,001,000
China	53,169,000	54,936,000	56,047,000	36,022,000	50,734,000
Egypt	41,516,000	24,330,000	27,618,000	26,203,000	58,510,000
France	327,182,000	289,591,000	283,356,000	205,535,000	240,107,000
Germany	550,159,000	626,284,000	612,690,000	503,185,000	230,166,000
Japan	31,280,000	47,621,000	60,783,000	46,651,000	41,969,000
Roumania	120,944,000	169,856,000	100,717,000	65,217,000	3,910,000
Russia	234,781,000	214,902,000	237,375,000	189,838,000	3,985,000
Spain	29,887,000	34,524,000	29,008,000	39,213,000	90,854,000
Switzerland	77,641,000	84,708,000	86,845,000	76,901,000	118,118,000
United Kingdom	509,831,000	577,130,000	591,776,000	504,934,000	849,404,000
United States	415,280,000	515,347,000	522,722,000	442,847,000	1,749,204,000
All other countries	297,344,000	328,437,000	327,025,000	269,072,000	436,576,000
Total[a]	3,389,298,000	3,701,922,000	3,645,639,000	2,923,348,000	4,703,550,000
EXPORTS TO—					
Argentina	166,194,000	182,111,000	185,557,000	115,924,000	141,103,000
Austria-Hungary	184,754,000	219,191,000	221,147,000	196,711,000	118,985,000
Belgium	51,865,000	74,648,000	57,788,000	30,331,000	2,182,000
Brazil	42,597,000	56,481,000	47,648,000	28,254,000	35,739,000
British India	31,924,000	37,879,000	49,458,000	38,689,000	51,221,000
Egypt	60,936,000	42,472,000	49,191,000	46,813,000	68,480,000
France	206,168,000	222,570,000	231,481,000	174,193,000	437,710,000
Germany	301,249,000	328,236,000	343,444,000	319,148,000	204,489,000
Russia	50,866,000	55,931,000	60,930,000	38,160,000	16,017,000
Switzerland	203,393,000	218,910,000	249,163,000	231,889,000	314,082,000
Tripoli and Cirenaica	24,739,000	100,779,000	78,499,000	58,520,000	72,896,000
United Kingdom	222,797,000	264,406,000	260,501,000	305,712,000	391,064,000
United States	247,230,000	261,938,000	267,892,000	262,462,000	283,359,000
All other countries	409,361,000	331,375,000	408,939,000	363,598,000	396,117,000
Total[a]	2,204,273,000	2,396,927,000	2,511,638,000	2,210,404,000	2,533,444,000

[a] Exclusive of precious metals.

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IMPORTS OF WOOD INTO ITALY, BY PRINCIPAL COUNTRIES OF ORIGIN, FROM 1912 TO 1918.

Articles and countries.	1912		1913		1914	
	Metric tons.	*Lire.*	*Metric tons.*	*Lire.*	*Metric tons.*	*Lire.*
Wood, common:						
Rough or simply hewn	200,396	14,047,720	189,497	13,833,281	155,658	11,674,350
Albania					212	15,900
Austria-Hungary	166,108	11,627,560	136,843	9,989,539	111,507	8,363,025
France	9,415	659,050	10,768	786,064	7,534	565,050
Germany	7,729	541,030	14,298	1,043,754	9,724	729,300
Japan	23	1,610	1,230	89,790	3,446	258,450
Netherlands	54	3,780	312	22,776	343	25,725
Russia	3,888	272,160	6,862	500,926	2,845	213,375
Sweden	1,819	127,330	935	68,255	1,345	100,875
Switzerland	5,638	394,660	9,698	707,954	11,333	849,975
Tunis	1,194	83,580	24	1,752		
Turkey, European	21	1,470	610	44,530	801	60,075
United Kingdom	17	1,190	854	62,342	1,956	146,700
United States	3,823	267,610	6,257	456,761	3,240	243,000
Squared or sawn lengthwise	1,203,458	120,345,800	1,158,328	115,832,800	960,703	105,677,330
Austria-Hungary	977,364	97,736,400	904,074	90,407,400	721,454	79,359,940
Canada	9,322	932,200	112	11,200	51	5,610
Dutch East Indies	5,465	546,500	6,242	624,200	8,543	939,730
France	5,522	552,200	6,633	663,300	3,328	366,080
Germany	3,593	359,300	5,780	578,000	3,846	423,060
Japan	4,800	480,000	1,086	108,600	2,487	273,570
Netherlands	3,111	311,100	128	12,800	877	96,470
Norway	720	72,000	458	45,800	584	64,240
Roumania	1,044	104,400	33,586	3,358,600	24,295	2,672,450
Russia	24,657	2,465,700	13,517	1,351,700	14,505	1,595,550
Sweden	5,207	520,700	3,290	329,000	3,296	362,560
Switzerland	4,272	427,200	4,998	499,800	5,600	616,000
Tunis	4,531	453,100	2	200	44	4,840
Turkey, European	7	700			190	20,900
United Kingdom	305	30,500	680	68,000	1,551	170,610
United States	150,541	15,054,100	174,207	17,420,700	160,652	17,671,720
	Quintals.		*Quintals.*		*Quintals.*	
In small boards for boxes	13,696	575,232	21,696	911,232	29,911	1,316,084
Austria-Hungary	12,068	506,856	19,683	826,686	25,347	1,115,268
Germany	1,054	44,268	563	23,646	967	42,548
Sweden	168	7,056	803	33,726	1,850	81,400
Switzerland	31	1,302	102	4,284	30	1,320
In sheets for veneering, less than 2 millimeters thick	1,573	117,975	1,962	127,530	1,349	91,732
France	1,045	78,375	1,531	99,515	907	61,676
Germany	297	22,275	407	26,455	315	21,420
In pieces for matches		163,060		148,200		133,602
Cabinetmakers' wood:						
Not sawn	66,082	2,114,624	34,730	1,111,360	16,814	554,862
Brazil	580	18,560	203	6,496	157	5,181
Central America	9,298	297,536	3,035	97,120		
Cuba	1,617	51,744	1,208	38,656	265	8,745
France	7,954	254,528	7,220	231,040	3,696	121,968
Germany	23,488	751,616	8,986	287,552	2,348	77,484
United Kingdom	17,757	568,224	8,180	261,760	4,182	138,006
United States	3,164	101,248	2,538	81,216	3,943	130,119
Sawn lengthwise	2,575	211,150	3,553	248,710	864	61,344
Brazil	109	8,938	409	28,630	46	3,266
France	483	39,606	581	40,670	172	12,212
Germany	753	61,746	1,124	78,680	350	24,850
United States	655	53,710	758	53,060	26	1,846

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IMPORTS OF WOOD INTO ITALY, BY PRINCIPAL COUNTRIES OF ORIGIN, FROM 1912 TO 1918—Continued.

Articles and countries.	1915		1916		1917[a]	1918[a]
	Metric tons.	*Lire.*	*Metric tons.*	*Lire.*	*Metric tons.*	*Metric tons.*
Wood, common:						
Rough or simply hewn	24,463	2,837,708	23,841	3,313,899	18,712	8,815
Albania	544	63,104	.....	.....	.....	.....
Austria-Hungary	4,729	548,564	.....	.....	.....	.....
France	2,725	316,100	2,357	327,623	4,266	4,046
Germany	3,062	355,192	.....	.....	.....	.....
Switzerland	12,236	1,419,376	20,680	2,874,520	14,269	4,712
United Kingdom	828	96,048	202	28,078	.....	.....
United States	120	13,920	318	44,202	93	.....
Squared or sawn lengthwise	204,873	34,828,410	283,858	66,422,772	213,542	116,274
Austria-Hungary	47,895	8,142,150	.....	.....	.....	.....
Canada	2,256	383,520	2,758	645,372	.....	.....
Dutch East Indies	1,367	232,390	.....	.....	.....	.....
France	1,531	260,270	1,803	421,902	1,365	1,833
Germany	6,203	1,054,510	.....	.....	.....	.....
Norway	.....	.....	71	16,614	.....	.....
Netherlands	100	17,000	.....	.....	.....	.....
Roumania	1,071	182,070	.....	.....	.....	.....
Russia	46	7,820	43	10,062	.....	.....
Spain	.....	.....	1,245	291,330	.....	.....
Sweden	5,580	948,600	835	195,390	.....	.....
Switzerland	62,967	10,704,390	160,006	37,441,404	178,672	94,567
United Kingdom	5,650	960,500	5,592	1,308,528	.....	.....
United States	63,590	10,810,300	111,008	25,975,872	28,167	17,131
	Quintals.		*Quintals.*		*Quintals.*	*Quintals.*
In small boards for boxes and sieves	10,406	499,488	20,183	605,490	8,069	4,612
Austria-Hungary	8,224	394,752	.....	.....	.....	.....
Germany	1,166	55,968	.....	.....	.....	.....
Roumania	.....	.....	1,607	48,210	.....	.....
Switzerland	479	22,992	18,495	554,850	7,843	4,442
In sheets for veneering, less than 2 millimeters thick	202	16,160	576	46,080	254	945
France	112	8,960	569	45,520	.....	.....
Germany	82	6,560	.....	.....	.....	.....
In pieces for matches	863	23,301	.....	.....	.....	.....
Cabinetmakers' wood:						
Not sawn	4,730	236,500	5,558	355,712	5,231	3,616
Brazil	.....	.....	351	22,464	.....	.....
Cuba	.....	.....	213	13,632	1,603	2,952
France	2,040	102,000	1,428	91,392	918	485
Germany	164	8,200	.....	.....	.....	.....
United Kingdom	1,108	55,400	2,621	167,744	1,265	179
United States	497	24,850	879	56,256	1	.....
Sawn lengthwise	185	15,725	534	50,730	18,211	1,085
Argentina	6	510	262	24,890	.....	.....
Brazil	.....	.....	5	475	.....	.....
France	12	1,020	98	9,310	.....	.....
Germany	36	3,060	.....	.....	.....	.....
United States	.....	.....	32	3,040	.....	.....

[a] The following are the only values available for 1917 and 1918, the figures for 1917 being final and those for 1918 provisional: Common wood, rough or hewn—5,314,208 lire in 1917 and 2,503,460 lire in 1918; squared or sawn lumber—69,828,234 lire in 1917 and 38,021,598 lire in 1918; box boards—403,450 lire in 1917 and 230,600 lire in 1918; sheets for veneering, less than 2 millimeters thick—30,480 lire in 1917 and 113,400 lire in 1918; cabinetmakers' wood, not sawn—695,723 lire in 1917 and 480,928 lire in 1918; cabinetmakers' wood, sawn—3,642,200 lire in 1917 and 217,000 lire in 1918.

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IMPORTS OF WOOD INTO ITALY FROM AUSTRIA-HUNGARY, SWITZERLAND, AND THE UNITED STATES FROM 1911 TO 1917.

Countries and articles.	1912	1913	1914	1915	1916	1917	1918
Austria-Hungary:							
Common wood—							
Rough or simply hewn..tons..	166,108	136,843	111,507	4,729	.....	.....	.....
Squared or sawn.....do....	977,364	904,074	721,454	47,895	.....	.....	.....
Box boards.....quintals..	12,068	19,683	25,347	8,224	.....	.....	.....
Sheets for veneering, less than 2 millimeters thick..quintals..	3	12	8	2	.....	.....	.....
Pieces for matches.....do....	4,060	378	2,801	123	.....	.....	.....
Cabinetmakers' wood:							
Not sawn.....do....	203	45	34	.....	.....	.....	.....
Sawn lengthwise.....do....	76	65	28	2	.....	.....	.....
Switzerland:							
Common wood—							
Rough or simply hewn..tons..	5,638	9,698	11,333	12,236	20,680	14,269	4,712
Squared or sawn.....do....	4,272	4,998	5,600	62,967	160,006	178,672	94,567
Box boards.....quintals..	31	102	30	479	18,495	7,843	4,442
Sheets for veneering, less than 2 millimeters thick..quintals..	152	6	48	4	.....	.....	.....
Cabinetmakers' wood—							
Not sawn.....do....	16	.....	22	.....	.....	.....	.....
Sawn lengthwise.....do....	51	106	.....	78	63	.....	.....
United States:							
Common wood—							
Rough or simply hewn..tons..	3,823	6,257	3,240	120	318	93	.....
Squared or sawn.....do....	150,541	174,207	160,652	63,590	111,008	28,167	17,131
Sheets for veneering, less than 2 millimeters thick..quintals..	54	4	8	.....	.....	.....	.....
Cabinetmakers' wood—							
Not sawn.....do....	3,164	2,538	3,943	497	879	1	.....
Sawn lengthwise.....do....	655	758	26	.....	32	.....	.....

EXPORTS OF WOOD AND MANUFACTURES FROM THE UNITED STATES TO ITALY DURING THE YEARS ENDED JUNE 30, 1913 TO 1918.

Articles.	1912–13		1913–14		1914–15	
	Board feet.	Value.	Board feet.	Value.	Board feet.	Value.
Logs and other round timber.....	898,000	$34,478	587,000	$18,778	37,000	$815
Hickory.....	50,000	1,850	61,000	2,410	.....	.....
All other.....	848,000	32,628	526,000	16,368	37,000	815
Timber, hewn.....	200,000	6,150	539,000	14,129	307,000	6,169
Timber, sawn.....	44,526,000	850,450	64,775,000	1,189,513	25,456,000	387,047
Pitch pine.....	44,501,000	849,600	64,483,000	1,180,981	25,456,000	387,047
All other.....	25,000	850	292,000	8,532	.....	.....
Railroad ties.....	.....	.....	[a] 4	4	[a] 183	129
Lumber.....	.....	359,477	.....	1,511,005	.....	455,782
Boards, planks, and scantlings—						
Fir.....	159,000	3,174	95,000	1,895	.....	.....
Gum.....	7,287,000	226,897	8,990,000	470,562	2,809,000	76,821
Oak.....	1,580,000	63,880	590,000	23,499	331,000	12,921
Pine, yellow.....	34,477,000	694,104	43,894,000	901,950	17,438,000	336,201
Poplar.....	20,000	800	.....	.....	.....	.....
Spruce.....	.....	.....	.....	.....	36,000	2,363
All other.....	[b] 796,000	[b] 22,287	54,000	1,940	48,000	1,764
All other.....	.....	7,962	.....	2,786	.....	3,691
Furniture.....	.....	85,789	.....	108,373	.....	22,021
Hogsheads and barrels, empty.....	.....	6,112	.....	5,849	.....	1,708
Incubators and brooders.....	.....	380	.....	112	.....	112
Trimmings, moldings, and other house finishings.....	.....	454	.....	.....	.....	.....
Shooks.....	.....	29,680	.....	40,553	.....	13,851
Staves.....	[a] 5,974,006	510,030	[a] 4,571,648	366,211	[a] 647,291	47,661
Heading.....	.....	5,538	.....	1,100	.....	.....
Woodenware.....	.....	1,883	.....	382	.....	18
Wood pulp.....	[c] 904,990	19,609	[c] 717,962	14,970	[d] 120	5,598
All other manufactures of wood..	.....	28,797	.....	37,797	.....	41,088
Total.....	.....	1,938,827	.....	3,308,776	.....	981,999

[a] Number.
[b] Including 586,000 feet of joists and scantling, valued at $13,550. There were no exports of joists and scantling to Italy in 1914 and 1915, and after that time such exports, if any, were included in "All other boards, planks," etc.
[c] Pounds.
[d] Tons.

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EXPORTS OF WOOD AND MANUFACTURES FROM THE UNITED STATES TO ITALY DURING THE YEARS ENDED JUNE 30, 1913 TO 1918—Continued.

Articles.	1915–16		1916–17		1917–18	
	Board feet.	Value.	Board feet.	Value.	Board feet.	Value.
Logs and other round timber, other than hickory	97,000	$2,894	92,000	$5,250	.....	.....
Timber, sawn: Pitch pine	29,946,000	495,794	17,684,000	366,677	983,000	$27,550
Railroad ties	.....	.....	[a] 4	4	.....	.....
Lumber	.....	819,075	.....	407,748	.....	1,554,393
Boards, planks, and scantlings—						
Fir	.....	.....	118,000	3,196	3,495,000	276,300
Gum	185,000	4,650	11,000	450	598,000	32,764
Oak	.....	.....	.....	.....	163,000	9,695
Pine, yellow	40,205,000	751,408	9,117,000	183,976	1,722,000	89,362
Spruce	288,000	24,522	2,069,000	193,898	9,638,000	1,127,052
All other	153,000	7,490	42,000	3,827	75,000	5,008
All other	.....	19,470	.....	19,042	.....	3,468
Boat oars and paddles [b]	.....	.....	.....	.....	.....	1,008
Doors, sash, and blinds	.....	.....	.....	.....	.....	5,977
Furniture	.....	11,535	.....	3,359	.....	637
Handles, implement and tool [b]	.....	.....	.....	.....	.....	84
Hogsheads and barrels, empty	.....	200	.....	250	.....	.....
Incubators and brooders	.....	25	.....	.....	.....	.....
Shooks	.....	13,851	.....	66,775	.....	.....
Staves	[a] 2,726,183	125,423	[a] 567,999	41,675	[a] 59,458	9,978
Heading	.....	20	.....	.....	.....	.....
Woodenware	.....	13	.....	1,501	.....	494
Wood pulp	[c] 1,426	71,019	[c] 257	22,778	[c] 3,066	373,557
All other manufactures of wood	.....	22,016	.....	16,655	.....	27,781
Total	.....	1,561,865	.....	932,672	.....	2,001,459

[a] Number.
[b] Included in "All other manufactures of wood" prior to 1918.
[c] Tons.

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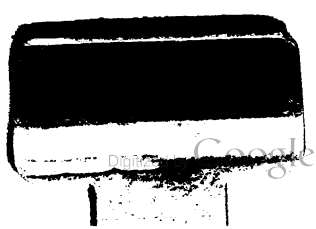

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